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Gender influences in the classroom interaction of young children using computers.

Cezanne. Nassr-Charlebois
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GENDER INFLUENCES IN THE CLASSROOM INTERACTION OF YOUNG CHILDREN USING COMPUTERS

by
Cézanne Nassr-Charlebois

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ABSTRACT

Gender Influences in the Classroom Interaction of Young Children using Computers

by Cézanne Charlebois

Using videotaped observations collected over one half of an academic year in classes composed of grade one and grade two students, this research examined the cooperative and aggressive interactions of students at the computers. In contrast to previous findings, this research discovered that girls in one class were more physically aggressive than boys, and that there was no association between gender and aggressive interaction at the other. Similarly, there was no association between gender and cooperative interaction at either location. Although some gender related differences have been reported on ask/respond type behavior, this research found that girls and boys asked and responded appropriately to questions by the other sex with equal frequency. Like previous research, the finding of same-sex preferences in interaction was supported, however problems in cross-sex interaction were not found. The structure of the learning environment and the highly evocative and unique nature of the computer were put forward as explanations for the above findings. Furthermore, the use of videotaped observations revealed dimensions of aggressive and cooperative interactions that may have been unnoticed in previous studies.

DEDICATION

To Bob Charlebois, the person whose love, support and incredible endurance, contributed immensely to the completion of this work. I dedicate this thesis to you.

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I. Introduction

Microcomputer use has entered the educational curricula of early elementary education. This is important for a number of reasons, one of which is the value placed on acquiring computer literacy. Clearly it is important enough that it should be introduced at the early elementary grades. Tiny children using microcomputers in education is at once awe inspiring and frightening. In 1982 Time Magazine coined the term "microkids" which illustrates this paradox quite well. They proclaimed "Here come the microkids" and referred to children as "bits and bytes", the new generation who would spearhead the electronic revolution or the information revolution (Cuban, 1986:73).

The introduction of this new technology into early elementary education is the source of much concern for parents, teachers and educational policy makers alike. Indeed, it has provided the opportunity for the re-examination of our educational objectives and theories of child socialization and development. A central concern in this context is how the computer literacy trend will contribute to or maintain existing dysfunctional relations among certain groups. Scheck (1985) suggests that the "computer literacy craze which is sweeping the nation may serve to advance the interests of only certain elements in society, to the disadvantage of minority groups" (:290).

Furthermore, he suggests that it may also enhance sex discrimination.

The reinforcement of gender stereotypes during computer activities is also a concern of the Ministry based research by Carmichael, Burnett, Higginson, Moore and Pollard (1985), Larter and Fitzgerald (1983) and the Ministry of Education (1983). Conceptualizing the computer as representing a cultural object which is defined as masculine is not uncommon. Furthermore, the notion that boys are better than girls in computer activities is supported by some anecdotal evidence in the Ministry based research. The reinforcement of gender stereotypes is often a concern in relation to the differential performances of boys and girls in various subjects.

Like mathematics, the computer sciences might be a critical filter for future careers and this places the examination of computers in education in the historical, cultural and political contexts. At the institutional level, Denzin (1977) says that "[s]chools might best be viewed as complex organizations with multiple paths or tracks to the top" (:27). The possibility that computers and mathematics represent the career track for boys must be explored. In like manner, we might wonder if girls are placed on the "mommy track"[1] as early as elementary

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[1] The "mommy track", a term recently coined by Felice Schwartz in Harvard Business Review (Feb.1989) refers to putting mothers in professional careers on lower-paid, lower-pressured career tracks because, by virtue of their motherhood, they are corporate liabilities.

education. It is the concern that men alone represent the "new generation who will spearhead the electronic revolution" that forces us to examine our educational goals and theories of childhood socialization and child development.

The recommendation to remove sex bias from educational curricula faces a new challenge. On the international level, this depends in part on the analysis of cross-cultural patterns of gender inequalities. Moreover, at the institutional level educators must consider their perspectives on gender development and definitions of childhood and child socialization that guide policies and current pedagogical practices and objectives. Similar considerations must be made in relation to the introduction of a new technology in education. Finally, most important of all is the classroom interaction of students with students and teachers, and the management practices and teaching strategies used by teachers. It is this arena that will provide rich data not only for the successful use of computers in education but also for the removal of sex bias from educational curricula.

II. Review of the Literature

The following review of the literature encompasses a number of different but related content domains. Specifically these are gender issues, classroom peer interaction studies and the educational use of computers. The focus of this research is on gender and its influence on classroom peer interaction. That this interaction is occurring during computer activities is a secondary interest derived from the fact that computer activities are presumed to be somewhat sex-typed in nature and are also the source of some rich interactional data. These three content domains will be represented in the review on three levels of analysis : (a) the cross-cultural, (b) the institutional and (c) the interactional levels.

Cross Cultural Studies of Gender Inequalities

The cross cultural analysis of gender inequalities has concentrated on stereotyping, socialization processes and differential task assignments. Tavris and Wade (1984) mention three studies which show that certain tasks have always been done by one sex or the other, and that socialization processes have supported these task assignments. These studies make the following claims: (a) If

a society's economy includes fishing, hunting large game, farming a long way from home, making weapons or metalworking, men have always handled these activities. Furthermore, men have always been primarily responsible for fighting wars, women for tending the children. (b) The cross cultural study by Murdock and Provost found fourteen activities that men, and men only, have done. These relate to hunting and butchering or to the processing of hard raw materials. (c) Boys are typically socialized to be self-reliant and to achieve, while girls learn to be nurturant, responsible and obedient (Tavris and Wade, 1984:20).

The cultural patterns referred to above, relate to biologically based explanations for sex differences by alluding to the greater size and strength of men and the reproductive functions of women. Apart from these patterns, say Tavris and Wade (1984), "most of the personality traits and specific activities that cultures assign to men and women vary widely" (:211). In short, they say that apart from biology, there are very few sex-based differences between men and women. Testimony to this recurrent theme is found in varying degrees of intensity throughout this review of the literature.

Yet, according to Williams and Best (1982), cultures assign very clearly defined traits to the sexes forming gender stereotypes that are virtually universal. They found extensive cross cultural generality in the psychological

characteristics associated with men and women in all age levels, which they say might be sufficient to :

> ...warrant their consideration as variform universals, that is, specieswide behaviours showing only minor variations as a result of specific cultural influences. (1982:231)

Their research showed differences in the ages at which children became aware of various stereotypic knowledge. That is, as the children grew older, their knowledge of items that characterized one sex or the other expanded (see Appendix A).

Williams and Best conclude that certain biological differences between women and men, make it socially efficient for them to assume different social roles, and that sex-trait stereotypes develop to support this task assignment and to provide models of the expected adult roles for the socialization of children (1982:231). To bolster their findings of cross-cultural similarities in sex-trait stereotypes, Williams and Best (1982) cite two studies which examine cross-cultural similarities on the behavioral level of analysis. Similarities in sex-typed behaviours that correspond to their sex-trait stereotypes are found in the work of Munroe and Munroe (1982:237) (See Appendix B for a description of the results reported by Munroe and Munroe).

In the work of Barry et al., Williams and Best suggest that there is dramatic evidence of pancultural similarity in the socialization of boys and girls in ways that are consistent with the cross-cultural sex-trait stereotypes

that they have identified. Barry et al. made a cross-cultural survey of sex-differences in the socialization practices of 110 cultures, most of which were non-literate (:237). One may argue that a comparative study done in 1957, primarily on non-literate populations, does not constitute "dramatic evidence of pancultural similarity", but it does reinforce the impression of pancultural similarities in sex-trait stereotypes. Even if there was ample evidence to support the three separate observations of cross-cultural similarity in sex-trait stereotypes, behaviour and socialization processes, the theoretical linking of these would require extensive research. At this time, however, there is still very little cross-cultural research in these areas, particularly in more complex societies.

Of particular interest to the present study however, is the finding by Williams and Best that children at the age of five have more knowledge of male sex-trait items and that by the age of eight their knowledge of male and female sex-trait items are equal, implying that these are the years during which substantial female items are learned. It follows from this line of reasoning that these might also be the years where certain educational policies could be implemented to shape the development of a more accurate female stereotype. On this matter, Williams and Best (1982) report that some stereotypic beliefs are accurate reflections, others are exaggerations of minor differences

and others are false, in that they assert differences that are not behaviorally demonstrable (:231).

Duley and Edwards (1986) present a cross-cultural study of women that tries to dispel all notions of cross-cultural similarities in gender stereotypes. Their analysis involved the re-examination of existing data, rather than actual cross-cultural research. To them, no stereotypic beliefs are accurate reflections of male/female traits and "biological differences", as used by Williams and Best above, are evidence of the universal male dominance theories typically used by biological determinists. Duley and Edwards see the academic study of gender inequalities as rather adversarial in tone.

> Crouching in one set of trenches are the biological and psychological determinists, who see male dominance rooted in unalterable laws of nature, such as greater male capacity for aggression....from the opposite trenches are feminist scholars who see the role of culture as primary in explaining gender inequality. (1986:iii)

Representing "mainstream feminist views", Duley and Edwards (1986) are opposed to any arguments supporting biologically based male dominance. From their perspective, gender is seen totally as a principle of social organization and thus a cultural product. Mainstream feminism, according to Tavris and Wade (1984), tends to adopt the sociological /anthropological perspective which regards sex differences as created and perpetuated by institutions, especially work and marriage, patterns of power and discrimination, and the

economic and ecological needs of society (:4). Duley and Edwards (1986) claim that a few feminist scholars such as Rossi and Sayers are seen as dissenting from mainstream feminism because they admit to some important biological differences between the sexes. Similarly, social constructionist feminists, like Mackie (1987), are criticized by Sayers for denying any role to biology (Duley and Edwards, 1986:4).

Convinced that biology has no role in sexual inequality, Duley and Edwards are led to search for a true matriarchal society. To them, the existence of matriarchies would refute the universal male dominance theories of the biological determinists (1986:33). They came to the conclusion that:

> ...feminists should not rely on matriarchies to bolster their case against biological determinists. (:35)

In a chapter called "Male dominance: Myth or Reality", Duley and Sinclair (1986) examine the debate over whether male dominance has been a universal historical and cross-cultural feature of societies. The search for an egalitarian society and the reinterpretation of historical and anthropological literature represents another attempt to discredit the universality of male dominance.

They claim that the anthropological literature is guilty of androcentric and ethnocentric biases. "The reinterpretation of old data reveals unnoticed dimensions of

female participation in all historical accounts of social life" (Duley and Sinclair, 1986:29). Whitehurst and Booth (1980) also point to problems of validity with "historical accounts which have neglected the more socio-historical facets of family, sexuality and particularly women" and suggest that the cautious use of history is in order (:1-2). To them, the concept of universal female subordination "...may in part reflect Western Cultural bias, with its denigration of domesticity and devaluation of informal power" (:29).

The attempts to discredit the universality of male dominance or female subordination with the search for a true matriarchy or an egalitarian society, or the reinterpretation of historical and anthropological literature, place the study of gender inequalities on the historical cross-cultural level of analysis. From this perspective gender is seen as a central organizing principle in societies. That this organizing principle reflects itself in socialization processes and educational policies and objectives is apparent. It follows that understanding this principle along with its subtle and not so subtle effects can contribute to the elimination of sex bias from educational curricula.

Trends In The Gender Literature

Questioning the universality of a two gender system of categorization is one of the major trends in the gender literature. Transsexualism and homosexuality are often discussed in this light. They are seen as evidence that biology (or the genitals) is not the inescapable basis of sexuality. This approach aims to discredit the claims of natural or inevitable sex differences that are biologically based. The argument here implies that sexuality is not confined to dichotomous categories but that transsexuals and homosexuals might form a third category.

Another trend in the gender literature with the same goal is gender transcendence. Mackie (1987) suggests that the literature has moved from the either/or of sex-typing to the both of androgyny to the neither of gender transcendence (:100). Gender transcendence is :

> ...a state where femininity and masculinity are transcended or superseded as ways of labelling and experiencing psychological traits and being well-adjusted human beings. (Mackie,1987:100)

Mackie (1987) uses Stephanie Waxman's children's book What is a girl? what is a boy? as an example of gender transcendence. She states that this book concludes that a boy is just someone with a penis and testicles and a girl is someone with a vagina and clitoris (:101). By implication, this means that all the rest (other than the penis,

testicles, vagina and clitoris) is socially created and can therefore be socially changed. Gender transcendence takes the separation between biology and gender quite seriously. In this theory, gender inequalities have nothing to do with male aggression, dominance needs, the hormones androgen or estrogen, female reproductive cycles, pre-menstrual syndrome, or greater male strength and size. Similarly, the social roles and sex-roles that are thought to correspond to these biological processes would be transcended or superseded in the "gender-blind" society that Mackie (1987) refers to. She says that in such a "utopian" society, children would be taught that the meaning of girl/boy or male/female is exclusively biological. To her, such a society is possible, but not probable (:100-103).

Mackie (1987) concludes that the connection between biology and gender are for the most part, "indirect and tenuous" (:30). She says that "gender is not an attribute of the individual, always there, like a nose" (:4).

This position has not gained much academic interest. As part of the gender transcendence movement among feminist scholars it is a popular academic trend, yet unsupported at this time. Although gender transcendence has not gained academic influence, the feminist ideal of equality of the sexes has had a profound impact on the ways in which gender-related phenomenon have been examined (Carter, 1987:246). For the most part, the sociological and psychological

literature accepts the two category system of classification that is based on biological beings, for both the physiological description of human beings (sex) and the social description of biologically sexed individuals (gender).

It is important to make a distinction between accepting: (a) the two gender classification that is based on biological beings and (b) accepting a biological explanation[2] for gender inequalities and/or differences. Feminist theory accepts neither. Psychological theories tend to accept number one only (except Freudian psychology which accepts both) and sociological theories tend accept number one only, except for the sociobiologists, who do generally accept biological explanations for gender differences[3].

There are many theories that offer explanations for gender differences that are not based on biological reproductive functions. Gender schema theory takes this whole process and puts it into the biological function of cognition.

Carter (1987) feels that gender schema theory is the most useful in examining gender differences relating to

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2 It is necessary to make a distinction between biological explanations that refer to reproductive functions of bodies and biological explanations of mind and/or brain functions. In general, what is referred to as biological explanations and attacks thereon connotes explanations based on reproductive functions. Theories or explanations that involve cognitive functions are still biological, although this is seldom mentioned.

3 Although there may be some justifiable overlap, a distinction should be made between gender differences and explanations of how these differences turn into inequalities. This paper is primarily concerned with gender differences and how they may influence interactional experiences and classroom performance.

inequalities and sex-typing. He says that certain realms of child development and sex typing have been exhausted or have proven themselves of minimal value in explaining gender inequalities. He argues:

1. Children's knowledge of sex stereotypes and relationships between this knowledge and sex typing in behaviour appear to have played themselves out.

2. Knowledge of sex-stereotypic information is well covered [cites Williams and Best (1982) as an excellent study].

3. Efforts to tie the acquisition of this knowledge to behavior have proven largely futile.

4. Attempts to tie gender constancy acquisition to other outcomes of the sex-typing process have also proven fruitless.

5. Research on psychological androgyny have also reached an impasse. (Carter, 1987:24)

Carter (1987) believes it is time to abandon our efforts at establishing empirical links between these processes (:24). He considers gender schema theories as the most fruitful means of exploring the sex-typing domain because:

> Already there is substantial evidence in both the child and adult literature that persons who are gender-schematic process gender-related information in a fashion different from that of their less schematic or aschematic peers...It is on links between gender schemas and behaviour and experience that I feel our field should next focus its efforts. (:248)

Gender schema theory offers some interesting interpretations of social behavior that do not depend on

resolving the biological debates over the genesis of gender differences and the social arrangements based on these differences. This theory focuses on patterns of thinking, feeling and responding to gender-related information and how these schemas are related to behavior. Indeed, it does not matter if individuals have a "biological tendency" or "genetic pre-disposition" to think one way or another, what does matter, are the patterns that emerge, and how these patterns relate to behavior. In this study on gender influences in the classroom interaction of young children using computers, the question of how gender schemas may influence the children's behavior could be highly revealing. Similarly, whether or not the teachers are gender-schematic or less schematic, may prove to be a significant variable in the observation of classroom interaction.

Institutional Considerations

In order to examine gender influences in the classroom interaction of young children using computers, two major issues emerge for educational institutions. These are: gender development in young children and managing the use of a new technology in education.

Knowledge of gender development is important for making policy decisions concerning sex bias in educational curricula and for developing classroom management

strategies. There is some disagreement on such developmental occurrences as "gender identity" and "gender constancy". Huston and Carpenter (1985) suggest that gender identity is present by the time children enter elementary school and that from age two onward, boys and girls play predominantly in culturally defined gender specific and gender appropriate activities. Furthermore, they say that from age two onward, "girls spend more time than boys in close proximity to adults" (:144). However, "by the time children enter elementary school" is a rather broad range, which does not indicate at what age one's gender identity is developed nor what really constitutes a "gender identity". Is it a permanently fixed schema or is it a flexible set of expectations that continues to develop throughout childhood? Kohlberg's concept of gender constancy is another concept that is subject to a rather wide range. Gender constancy is the knowledge that one's own gender is an unalterable life-long aspect of the self. Kohlberg suggests that children develop gender constancy between two and seven years of age and the ability to categorize children as boys or girls appears around three years of age (cited in Roopnarine and Mounts, 1987:16).

The ability to apply gender labels correctly to oneself and to others and to show sex-typed preferential behaviors was found to become a stable phenomenon no earlier than three years old in a study by Thompson (cited in Wynn and

Fletcher, 1987:82). The Thompson study also found that both of these phenomena were preceded by an awareness of sex-role stereotyping which was evident at two years of age and more pronounced at two and a half years of age. Wynn and Fletcher (1987) cite the Thompson study as evidence that gender identity does not necessarily precede the appearance of same-sex preferences (:82). Although their point in making this argument is not clear, it is clear that Wynn and Fletcher support the theory that children act as their own socializing agents and this may explain sex segregation and early sex typing in play. They say that children detect the regularities governing traditional sex roles and interpret them as rules to be applied, even in play, and young children consider all social rules to be binding (:81). From their position, it is the responsibility of educators to change the "regularities" governing traditional sex roles. By implication, this suggests that if educators do change these "regularities" which children interpret as rules to be socially binding, at least the more gender-neutral rules are better. There is an implicit assumption of passive socialization here, even though the authors support the theory that children act as their own socializing agents.

The ways in which educators can accomplish this task, according to Wynn and Fletcher, are to promote cross-gender play with gender-neutral toys and, furthermore, to encourage a non-sexist curriculum. For those who would encourage these

changes, Wynn and Fletcher say "the potential for change is enormous" (1987:82). Indirectly stated by Wynn and Fletcher, these changes will increase cross-gender play and reduce sex-role stereotyping (:84). The assumptions underlying this argument appear to be that the frequently occurring sex-segregated play in children contributes to or even causes sex-role stereotyping and maybe by implication, negative sex-role stereotyping. Wilkinson, Marrett and Lindow (1985) say that

> Much research proceeds from the assumption that gender inequalities and sex-role stereotypes are likely to persist in the absence of cross-sex interaction ... and given the long-term significance of cross-sex interaction, it is perhaps not surprising that studies of peer interaction centre especially on the extent of sex segregation and the conditions under which it might be discouraged. (:7)

This may be why there has been considerable energy to eliminate overt sexism in policies, programs, practices, materials and to promote gender fair textbooks in our education system (Lockheed, 1985:168). But Lockheed is also quoted as saying that:

> ...a more fundamental form of sexism, one that threatens to undermine all these positive gains- has remained untouched and unchanged:the universal tendency of children to segregate themselves on the basis of sex for virtually all social and academic activities (:168).

The above discussion highlights three very important assumptions: (a) That frequently occurring sex segregation by children causes or contributes to sex stereotyping. (b)

That this same frequently occurring segregation is a form of "sexism". (c) That the long-term significance of cross sex interaction in children is the reduction of sex stereotyping. These are very powerful assumptions yet they are almost completely unsupported by research and sound academic theory.

There appears to be a significant amount of confusion around the development of gender identity, the awareness of sex-role stereotyping, the ability to apply gender labels correctly and sex-typed preferential behaviours and playmate choices (Thompson, 1975; Wynn and Fletcher, 1987). However, there is a general consensus that all these developmental milestones occur between two years of age and seven years of age.

There is one developmental pattern which appears to have almost universal consensus. This is that sex segregation by children occurs in both academic and play activities from a very young age (Wynn and Fletcher, 1987:79; Lockheed, 1985:168; Katz, 1979:168; and Cahill, 1986:178). Children begin to segregate their play activities by sex during the pre-school years and by ten this segregation is quite extensive (Katz, 1979:168).

Kohlberg (1966) explained the tendency of children's sex-segregation as a behavioral reflection of their stage of cognitive development. Children at this stage have "egocentric evaluative tendencies" tending to value things

"like me" and devalue things "not like me" (Kohlberg, 1966:83). From the cognitive developmental perspective, we could expect sex-typed behaviors from children as young as three years old, and more definite sex-typed preferences in activities and playmate choices by children in the early elementary grades.

From a symbolic interactionist perspective, children's activities must provide for the "behaviourial displays of normally sexed identities and interactional confirmations of those identities" (Cahill, 1986:177). Goffman contends that boys engage in activities which provide opportunities for what they consider to be behaviourial displays of masculinity and girls, for what they consider to be behaviourial displays of femininity (cited in Cahill, 1986:178). Furthermore, very few of children's play activities appear to provide equal opportunities for the behavioral expression of both masculinity and femininity (Cahill, 1986:178).

This raises some interesting questions about computers. Can computers be considered to provide equal opportunities for the behaviourial expression of masculinity and femininity? Do they? What does it depend on? Software programs? Teacher management styles? It seems as though the computer has the potential for being one of the few activities that can provide for both. However, at this time, there is not enough research on cross-sex and sex-segregated

interactions during computer activities to determine this. Consequently, educators do not know how to structure computer activities around the gender issues. In two Ministry of Education studies, Larter et al. (1983) and Carmichael et al. (1985) there is some anecdotal evidence which suggests classroom management concerns associated with cross-sex interaction at the computers. Specifically, some teachers have suggested that boys are too aggressive at the computers when paired off with girls and that girls prefer to be with girls.

On the other hand, there are concerns about personality development, interpersonal skills and negative gender stereotyping which are associated with sex-segregation in academic and play activities.

The self-imposed sex-segregation in play activities and friendship groups is thought to be the source of a number of gender differences. Cahill (1986) maintains that boys and girls develop different interpersonal skills during the apprentice stage of their socialization because of this self-imposed sex-segregation (:178).

Sex-segregation by children is also thought to lead to the development of strongly sex-typed tendencies. Roopnarine and Mounts (1987) express concern about the:

> ...negative consequences of high sex-typed preferences on personality development, and the stifling and demeaning impact of sex discrimination on both men and women. (:25)

There are other concerns about strongly sex-typed individuals:

> ...they limit their opportunities for exposure to the wide array of situations they would encounter if they were androgynous. (Bem, 1974)
>
> ...they are restrictive, constantly referring to internalized sex role standards and therefore missing out on formidable social experiences. (Roopnarine and Mounts, 1987)
>
> ...they have lower intelligence and appear to be less creative. (Maccoby, 1966)

It appears that the literature on sex role development and early educational experiences is overwhelmingly in favour of reducing sex-segregation because of its presumed association with the above mentioned negative consequences. Gender related issues emerge as important educational considerations in all curricular areas including computer activities. The introduction of a new technology in education provides rich opportunities for re-examining these issues. Of special interest to this study on gender influences in the classroom interaction of young children using computers are the differences between cross-sex and same-sex interactions that occur during computer activities. Also, the collaborative learning and peer teaching that occurs in small groups of children using computers are especially interesting areas in which to examine the gender issues.

Clearly of interest to educators is whether or not the computer should be one of those areas where cross-sex

interaction is encouraged or discouraged. The computer itself has the potential of being one of those rare gender neutral activities which educators might like to utilize. However, as supported above, there are some important beliefs and attitudes about computers that may contribute to their being thought of as a predominantly masculine activity.

Classroom management practices may also contribute to the sexualization of computers. Mackie (1987) uses Richer's observational study of Ottawa kindergarten classes as an example of how teachers can emphasize the gender schema as a practical means to organize the children. For example, the children lined-up by gender to move from one activity to another. The teacher also used gender to motivate participation with statements like " the girls are ready, the boys are not " (:133). The teachers' attitudes about traditional gender roles and the degree of structuring the learning process in the classroom are expected to contribute to the gender influences in the classroom interactions of young children using computers. These will be discussed in the following section "Gender Influences in The Classroom".

Children's universal tendency to segregate their activities by sex and the management problems that have been discussed with cross-sex interaction at the computers also present themselves as variables to be researched with the management of this new technology in education.

Much of the literature on managing the use of computers in education has focused on technological training, cost effectiveness, implementation, software and hardware decisions, new learning theories and the changing role of teachers.

The other primary concern is aimed at making suggestions for the intelligent curricular application of computers. A tremendous amount of research has been generated in areas such as Computer Aided Instruction (CAI), Computer Aided Education (CAE), Computer Aided Learning (CAL) and Electronic Learning. Most of this research deals with programming, software, hardware, individualistic learning theories and management strategies. Very little deals with the cooperative efforts and peer interaction of students using computers.

Many of the fears that parents, teachers and educators have about children becoming like robots may be related to the lack of research on the highly interactive nature of computer activities and software programs. Very little research has focused on, or even mentioned, the vital role of student interactions in this whole process. Where the student interactions have become management problems, as in cases of mixed-gender dyads, then cursory mention is given. However, the few studies that do examine the interactive nature of computer use are quite enthusiastic about the cooperative use of computers in school.

Computers In Elementary Education and Gender Influences: Classroom Studies

Some authors have cited a few problems or gaps in the classroom research at this time. First of all, peer interaction or student/student interaction has recently been referred to as the neglected variable in education (Carmichael, 1985; Johnson, 1981:5; Lindow, Marrett and Wilkinson, 1985:1). Theoretically, this is interesting because it suggests a research bias or error in all educational research aimed at or discussing children in the classrooms. Empirically, the lack of research in this area limits the number of theoretical and methodological comparisons that can be made. On a more positive note, the researcher focusing on classroom interactions is exploring relatively uncharted territory.

In the research on student interactions that does exist, there are a few criticisms. Morine-Dershimer (1985) discusses two major gaps in the research on student interactions. These are : (a) Pupil perceptions of peers that identify the important interactive characteristics from the students perspective and (b) a gap in the classroom interaction research in general which is characterized by too much of a focus on teacher/student interaction (:238). Webb and Kenderski (1985) cite another problem relating to

classroom interaction studies. She says that most research on interaction in mixed gender groups has been conducted outside the classroom and using non-academic tasks (:209-210). Essentially, these issues relate to the research methods employed and the reliability and validity of such methods.

With a general lack of research on student/student interactions, the research on gender influences in these interactions is similarly sparse. Wilkinson and Marrett (1985) have made this topic the focus of their book Gender influences in the classroom. They say:

> A voluminous literature covers the general subject of male-female differences, and a sizeable body of research exists as well on patterns of interaction in the classrooms. Studies that compare the classroom interaction of boys and girls are relatively scarce, but a few of the studies report clear-cut gender related differences. (Wilkinson and Marrett, 1985 :1)

Gender related differences in classroom interactions have recently become important to some researchers because of their presumed association with academic achievement, performance and occupational roles in the future. Wilkinson and Marrett say that:

> The stability and persistence of gender difference in reading and mathematics performance, in entry into technical fields have given rise to a concern about sex equity in the classroom.... This book explores the possibility that these differences are "rooted in gender-based contrasts in interactional experiences in classrooms". (1985:1)

Brophy (1985) echoes this view when he notes that the trend in research has shifted from a focus on the poor reading performances of boys in elementary school classrooms to explaining the under-participation and under achievement in mathematics and science by female students at the secondary school (and higher) level.

Fennema and Peterson (1985) also say that gender related patterns of interaction merit attention because of their consequences for academic achievement (:13). However, the precise relationship between gender related patterns of interaction and academic achievement was not clearly defined by Fennema and Peterson. In fact, this is a difficult relationship to establish. Spence, Deaux and Helmreich (1985) say that

> ...theorists have underrated both the complexity and the specificity of the relationships between personality dimensions and particular sex-role behaviors and preferences...and coherent theoretical statements of any degree or breadth are undoubtedly some years away. (:161-172)

Webb and Kenderski (1985) did try to examine the precise relationship between gender related patterns of interaction and academic achievement in a high-achieving and low achieving mathematics class. They examined the relationship between the success of males and females in receiving adequate help and that relation to achievement. Their work tries to exhibit some specific applications of how the instrumental/expressive orientations may be directly linked to performance or achievement.

Webb and Kenderski (1985) cite a number of studies which suggest that in most of the research on gender influences on classroom interaction the male has been shown to dominate group activity (:210). Their research suggests that gender operates as a status characteristic in certain groups, where males are expected to be more competent than females and consequently they are more likely than females to hold positions of power, prestige and influence in a group. In the high-achieving classes, the Webb and Kenderski postulated that males exhibited their "dominant" position in small groups by being selective in whom they chose to help.

Furthermore, the analysis of gender differences in the small group interactions showed that the higher achievement of males than females in the high-achieving classes may be explained by the tendency of males to be more successful than females in obtaining help when requested. Webb and Kenderski (1985) say that this result was due to the fact that females were much more responsive to requests for help (from both males and females) and that the males were particularly unresponsive to the females' requests for help (:229-230). The kinds of questions asked emerged as an important variable in this study. Understandably, the specific questions were more likely to elicit a response than questions or statements indicating general confusion. Females were found to be more likely than males to ask

general questions which usually elicited no response, especially from the males.

Some very interesting results were found in the low-achieving classes studied by Webb and Kenderski (1985). The low-achieving classes shared none of the gender differences in achievement and interaction that appeared in high-achieving classes. Females were at least as successful as males in obtaining help and were not more responsive than males to requests for help. Webb and Kenderski (1985) found that the lack of gender differences also showed in the kinds of questions asked - where males and females showed similar frequencies of asking for and receiving answers to specific and general questions (:230).

To explain the differences between the high and low-achieving classes, Webb and Kenderski (1985) suggest that in the low-achieving classes, both males and females may have perceived that no one was good in mathematics, resulting in lack of differentiation and allowing females a more prominent position. In other words, there was an inoperative gender stereotype, "similar to Kagan's (1982) finding of a weak or non-existent male performance stereotype in working class samples" (:230). This implies that gender does not function as a status characteristic in some groups, and maybe more specifically in minority groups.

In this study by Webb and Kenderski (1985) the two groups being examined had very different minority status. As

might be expected, the high-achieving class was composed of predominantly white, middle to upper middle class students and the low-achieving class was predominantly blacks and hispanics from lower socioeconomic areas. Webb and Kenderski gave only a cursory mention to this important distinction between the composition of the groups studied. In their concluding paragraph, they mentioned that:

> ...[I]t is not clear wether the differences in interaction patterns across the two studies reported here are derived from the achievement level, socioeconomic status, or racial background of the students. (1985:234)

Clearly the lack of discussion concerning these essential variables is a shortcoming in the research by Webb and Kenderski (1985). Without doubt, these variables may be expected to influence a secondary set of variables concerning the socialization and education of children in schools. The children in the low-achieving mathematics class may be subject to a completely different set of role and task structures than the children in the high-achieving class by virtue of any one or all of the above mentioned variables. Although research on the relationship between role and task structures and classroom interaction is limited at this time, the significance of their association is presumed worthy of future research by a number of researchers (e.g., Levine and Wang, 1983; Wilkinson and Marrett, 1985).

Despite the deficiencies in the research by Webb and Kenderski (1985), their research does make a small but vital contribution toward understanding gender influences in the classroom. Unlike many others, their research attempts to examine actual behavioral patterns of interaction in boys and girls. It therefore provides other researchers with some methodological and theoretical tools for future analysis. For example, the present research on gender influences in the classroom will be looking at "question asking" behavior, with the expectation that boys and girls might ask and respond to questions differently. Like Webb and Kenderski (1985), the present research is guided by a commitment to understanding gender influences in the classroom by examining actual classroom interactions.

A substantial portion of the research on gender influences in the classroom relies on past concepts, observations and descriptions, without grounding the studies in the actual behavior of children. Researchers frequently rely on the instrumental/expressive distinction to imply or explicitly specify that these trait dimensions are strongly linked to gender-role performances and achievement. Spence, Deaux and Helmreich (1985) call our attention to the importance assigned to sex differences in instrumental and expressive qualities by many theorists, despite their disagreements about the origins, desirability, or inevitability of these differences (:155). Furthermore,

these authors found that the expressive/instrumental distinction is preserved and supported by the research not in the sense of two extreme ends of a single continuum, but in the sense of a subtle, multidimensional process (:159). The question for educators to examine is how these expressive/instrumental traits may influence the interactional experiences of children in school. Similarly, educators must also consider how the expectations and attributions of both teachers and students concerning expressive and instrumental traits may affect academic performance.

The question of instrumental/expressive traits may be particularly enlightening when examining gender influences in the classroom interaction of children using computers. The Webb and Kenderski (1985) study mentioned above, may be examined in terms of the instrumental/expressive schema of categorizing behavior. We may say that males in the low-achieving classes did not exhibit instrumental qualities to the same degree as those in the high-achieving classes. Instrumental qualities are usually described as involving achievement oriented, self-directed, and goal oriented behaviors such as independence, assertiveness, decisiveness. The females in the high-achieving class of Webb and Kenderski's study may be viewed as exhibiting their expressive qualities in that they were quite responsive to the needs of others. They were more interpersonally oriented

than task oriented. Other expressive qualities are typically described as emotive in nature, such as kindness, sensitivity to others, emotional responsiveness and need for affiliation (Spence, Deaux,and Helmreich, 1985:154). An interesting problem emerges when we consider that the females in the low-achieving class were not more "expressively" oriented than the males but were equally "instrumental".

This observation alone highlights some fundamental problems with using the instrumental/expressive distinction to discuss the findings by Webb and Kenderski. First of all, instrumental traits are associated with goal directed, task oriented behavior, both of which are associated with academic achievement. In the low-achieving class, females were found to be as "instrumentally" oriented as the males (i.e., they showed similar frequencies of asking for and receiving answers to specific and general questions), yet they remained in the low-achieving class. Similarly, the females in the high-achieving class were found to be more "expressively" oriented (i.e., females were much more responsive to requests for help, and tended to ask general questions), yet they remained in the high-achieving class. Webb and Kenderski (1985) use the differences in asking for and receiving help between males and females as a possible explanation for differences in academic achievement. Yet their findings place serious limitations on the association

between "effective speakers" and achievement. At best, their findings indicate that the relationship between "effective speakers" and achievement is secondary to social class and race in education. In this study by Webb and Kenderski (1985), it may be the expectations and attributions of both teachers and students concerning expressive and instrumental traits that have influenced academic performance, rather than their effective communication skills.

Although there is no doubt that communication skills play an essential role in academic achievement, it is overly simplistic to reduce differences in achievement to one rather weak causal link, especially when that link may not apply to all social classes and racial groups. More important are the social processes in the development and maintenance of these "communication skills" and the perceptions, expectations, and attributions that accompany them. Acknowledging the processual and developmental nature of social phenomenon changes the basic unit of analysis from the individual and her/his environment, to the social act and its environment. The essential difference between these two units of analysis is the type of data generated. The "individual/environment" unit of analysis produces observations, traits, attributes, and other static descriptions of social life. On the other hand, the "social act/environment" unit of analysis produces understandings

of the dynamic, symbolic and socially constructed nature of social life.

Much of the gender literature has utilized the "individual/environment" as the unit of analysis and has generated a significant amount of non-symbolic, substantive information on differences in academic abilities and social performances between the sexes. One author suggests that there are primarily four differences between the sexes that are well established. These are: verbal ability (girls score higher) and visual-spatial, mathematical and aggressive activity (boys score higher) (Hollander, 1981:197). It may be noted that "aggressive activity" is not an ability, but a kind of social performance that is presumed to be related to other academic and social abilities. Whether or not "aggressive activity" is biologically determined, influenced or conditioned is a matter of great debate in the literature. At the very least, "aggressive activity" may be considered to be a frequently observed form of behavior, which has been found quite often in the activities of males.

Of the four differences in abilities and behavior cited above, aggressive activity represents the behavioral difference most commonly found and cited. Hollander (1981) says that aggression and dominance are the two main forms of social behavior on which women and men are seen to differ. Relating to these, he says that behavior in mixed-sex groups shows three major differences between the sexes. These are:

participation rate, communication content and leadership. In reviewing some of the literature on mixed-sex groups he suggests that the findings that men initiate and receive most of the communication, participate more and emerge as leaders more, are often the result of "sex-biased" tasks. Moreover, he says that women are less often selected as leaders because of the stereotype associating masculinity with dominance and leadership (Hollander, 1981:199-203). In a more recent article, Hollander (1985) says that:

> [a]large part of the issue of women as leader is contained in outmoded ideas about activity and dominance. Although differences in these qualities have been observed between women and men in groups, the nature of the activity and its context are important. For instance, women show less physical aggression, bearing in mind that there is considerable cultural encouragement for boys to engage in physically aggressive contact sports, as Mead (1949) has long since noted. Girls may be "aggressive," but not as much in physical ways. Deaux (1976) contends that women are as active as men, but that the areas in which they may strive to achieve are different. With respect to being dominant, assertive, or competitive, women in mixed-sex company are often constrained to be less obviously so than men. (:520)

The issues of gender-biased[4] tasks and an operative gender stereotype are quite important factors in the analysis of mixed-sex groups and they do represent sufficient grounds for questioning findings in small-group research which

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[4] A distinction should be made between "sex-biased" tasks and "gender-biased" tasks. A "sex-biased" task should properly be confined to those tasks which relate to the physiological properties of sexual beings. "Gender-biased" tasks should be confined to those tasks that are socially construed as appropriate for one sex or the other. Conventional use of the term "sex-biased" in the literature has failed to make such a distinction. The author has not found one instance of the term "gender-biased" task in the literature. This research shall utilize "gender-biased" to refer to all tasks that are not unquestionably "sex-biased".

report on differences in leadership, communication, aggression, dominance and competition between the sexes. In addition, these issues shift the focus of attention from an emphasis on the individuals patterns of interaction, behavioral tendencies and abilities to those phenomena directly relating to the teacher and the structure of the learning environment. Such a shift represents a shift toward the more processual and symbolic sphere of social acts.

In considering the issues raised by Hollander (1981, 1985) above, the question of gender-biased tasks and operative gender stereotypes may be revealing in the analysis of task performance in the classroom. Concerning the question of gender-biased tasks, the computer itself may be an object to be examined in this light. Two questions emerge: (a) Does the software encourage competitive or cooperative behavorial responses? and (b) Do computer tasks gives males an advantage over females because of presumed or real differences in visual/spatial and mathematical abilities?

More important than what the computer and software elicit might be the kind of behavioral responses encouraged by the teacher in her/his management of the classroom. It is fairly well documented that the teacher's role and task structure as they are evidenced and supported by her/his behavior in the classroom are important determinants of

students' performance and behavior (Levine and Wang, 1983). Thus, if there is an operative gender stereotype imbedded in the teachers conception of the student role, then we may expect that stereotype to be imparted to the children as part of their "socialization for both scholarship and citizenship" (Blumefeld, Hamilton, Bossert, Wessels and Meece, 1983:143).

That the teacher's conception and implementation of the student role and task structure might reflect gender-biased tasks, operative gender stereotypes and various performance perceptions, is well documented at this time. The general association of these observations with the performance and perceptions of students is also well documented (Levine and Wang, 1983; Wilkinson and Marrett, 1985). However, these observations have not yet led to practical applications to curricular requirements, day-to-day classroom management and pedagogical strategies. In reviewing the research on students' and teachers' interpretation of achievement-related behaviors, Good (1983) echoes this view and claims that the research does not "lead to concrete statements or suggestions for classroom practice, but present important concepts that should encourage teachers to think more extensively about their behavior and its potential effects upon students" (:125).

The formulation of concrete statements or suggestions for classroom management depends on more research which uses

the social act in relation to the environment as the basic unit of analysis. Certainly, there are a number of factors that would influence any interaction at the computers. These may include the software being used, the nature of the computer assignment or activity, the structure of the classroom learning imposed by the teacher and the basis on which the students and/or teacher decide on the composition of the groups to be using the computers. However, at this time there is no literature which examines these factors in conjunction with student interaction variables. Consequently, most manuals for teachers involve only hardware and software discussions and their incorporation into curricular needs.

For example, Walter Burke (1986) wrote Computers in the classroom...What shall I do?. This book is an excellent manual for teachers and presents a very thorough discussion on the technical aspects of buying, installing and using microcomputers in the elementary classroom. Furthermore, it provides many references and resources for teachers to get as well as a comprehensive description of almost all software available. What this book does not do, is discuss the social organization of computer use. Burke (1986) mentions that:

> [t]here are always children who try to monopolize the equipment because of enthusiasm, interest and ability. The teacher must ensure that all children have equal opportunities to use these materials. (:123)

This quote represents the extent of the social organizational discussion. There is no mention of how to work out these "equal opportunities", nor how to resolve the problems of children monopolizing the computer or even what interactional factors to consider when making such decisions. This lack of information in an otherwise highly informative manual represents the current amount of research available. However, there is some literature which reveals a great deal of enthusiasm and positive statements about the cooperative use of computers in education. For the most part however, this literature represents very thick descriptions of empirical issues without systematic analysis.

The Carmichael et al. (1985) study, which is the most comprehensive of the recent Ministry of Education based studies, very much resembles an ethnography, in the sense of it being a "thick description" (Geertz, 1973). However, the Carmichael study is not an ethnography because it is lacking in an attempt to build a model of the important and recurring variables and the relationships among these variables that describe and account for the behavior observed. The tremendous enthusiasm and positive statements about the cooperative use of computers may provide researchers with theoretical blocks for theory building. There is another benefit of these anecdotal studies and thick descriptions - they have brought educators and

researchers alike to recognize the importance of the "social" in individual development.

Up to this time, the type of social interaction emphasized in education has been that between teacher and student. Peer interaction has generally been limited to extracurricular activities (Carmichael et al., 1985; Johnson, 1981;). With limited peer interaction, "most educational strategies are dominated by individualistic and competitive learning experiences" (Johnson,1981:5). The possibility of pedagogical methods being dominated by such experiences has interesting implications for interactional experiences relating to gender and ultimately to academic achievement. Clearly, individualistic and competitive pedagogical methods favour the more instrumentally oriented individuals, who, as was seen above, are generally perceived as being males.

Johnson (1981) stresses the importance of frequent peer interaction in education: he says that the current emphasis on teacher/student interaction is evidence of a serious discrepancy between current educational practice and knowledge, and claims that student/student interaction may well be the more important determinant of educational success (:5). It is well known that social interaction plays an important role in the development of all higher mental functions (Inagaki, 1981:26). It is this recognition of the

"social" in studies of individual development that Mehan (1981) refers to as "social constructivism" (:71).

Social Constructivism is the principle that states that social structures and cognitive structures are composed and reside in the interaction between people (Mehan, 1981:71). Social Constructivism is not a theory, but a principle found implicitly or explicitly in many theories. It embodies two themes: the social construction of social structures and the social construction of cognitive structures. Constructivist themes in sociology and psychology have moved in the direction of shifting the process of construction from the personal and subjective level to the interpersonal plane, placing the locus of control in the interaction between people (Mehan, 1981:72). Social constructivism, when applied to education, would properly question individualistic and competitive learning in preference for much more interactive pedagogical methods.

Recent observations of peers interacting at computers open up new opportunities for questioning these notions of individualistic learning. These studies all indicate high levels of student interactions and claim numerous benefits for these interactions. Consider the following examples:

> ...[A]n environment that encourages exploration leads to extensive social interaction among students and that students become more willing to express, refine, or revise their ideas. (Carmichael et al., 1985:iv)

> With so few machines, the pupils must learn to take turns, to share, and to cooperate. The

> necessity for pupils to develop such skills in order to get the maximum use of the machines is seen by many teachers as highly beneficial...This sharing of knowledge and information among pupils develops their social skills. (Larter et al., 1983:39)

> [A] significantly greater proportion of students experienced an increase in their confidence and self-esteem if their teacher was able to give them greater autonomy over their learning and fostered social interaction. (Carmichael et al., 1985:iv)

In the first quote mentioned above, there is some evidence of the social construction of knowledge, although this is not explicitly stated. Because of the "extensive social interaction" students became more willing to express, refine or revise their ideas. It is not clear whether an environment encouraging exploration on an individual level or the extensive social interaction was the primary cause for these individual benefits.

In the second quote, it is claimed that the "sharing of knowledge and information develops their social skills". An alternative way of expressing this might be that the high level of pupil interaction encourages the integration of knowledge and information processing as well as the development of social skills. It is in this rich interactional environment that educators can re-examine current pedagogical methods and theories.

The Carmichael et al. (1985) study suggests that there is an "increased capacity for learning in the computer environment" and that a "unanimous reaction from teachers in this study was the amazement at what children, regardless of

perceived ability, were capable of learning" (:252). It was suggested that the computer changes attitudes about learning about passive learning, about success and failure, about the nature of "truth" and the relationship between teacher and learner (Carmichael et al., 1985:252). There was no mention that the perceived "increased capacity for learning" had something to do with the extensive social interaction among students. Like most of the perceived benefits of the cooperative use of computers in education, there was very little theoretical substantiation or discussion.

In summation, the above review of the literature reveals that interpretive interactional analysis is lacking not only in gender studies but also in recent research on children using computers. Three general areas of research that require further investigation are: 1) The importance of peer interaction and the recognition of the "social" in studies of individual development and the relevance of these to current educational practices and goals; 2) An important association between gender-based interactional differences and academic achievement or performance is found but not adequately understood or researched; 3) Very little is known about the classroom interaction of children using computers. Even less is known about gender influences on these interactions.

Of the genderal literature that does exist on gender influences in the classroom, numerous findings have been reported.

Behavior in mixed-sex groups is characterized by males participating more, initiating more communication, and emerging as leaders more often than females. Furthermore, in situations of disagreement or "dissension episodes", as Wilkinson et al.(1985) refer to them, boys' answers prevail more often than girls' (:196). The patterns of interaction in mixed-sex groups are found to show cross-sex conflict and strong tendencies for same-sex interaction, and request/response sequences that show girls are indifferent to who they ask for help and are willing to help both sexes, whereas boys show more "exclusivity" in whom they choose to help (Wilkinson et al., 1985; Webb and Kenderski, 1985). The problems faced by educators, according to the literature, reveal management concerns with cross-sex interaction. These concerns specifically relate to the observation that boys are too aggressive when paired off with girls at computers (Larter et al., 1983; Carmichael et al., 1985) and that boys tend to dominate the keyboard. Teachers appear to be faced with the dilemma of managing conflicts arising from cross-sex interaction and trying to address differential academic attainment and interpersonal skills that are presumed to be a function of sex-segregation. There is a prevalent concern with the

observation that " [t]he gap in computer skills between boys and girls starts in elementary school and grows through highschool" (Johnson, Johnson and Stanne, 1985). The above findings in the literature indicate that the social research in the area of gender interactions has tended to focus on the social consequences of these interactions, such as sex-typing, sex-segregation, gender stereotyping, differential skill attainment, and sexism. The processual and interactional nature of these behaviors have been ignored.

Despite the absence of interactional research in the gender literature, a number of findings emerge as well documented. Indeed, some findings are so well documented that they have almost attained the status of "universal" in understanding social conduct. For example, Williams and Best's (1982) cross cultural study is widely cited as evidence of the universality of sex-role stereotyping (see Mackie, 1987; Carter, 1987). That children are found to prefer same sex interactions in both academic and non-academic tasks from a very young age seems also to be considered a "universal" truth or generic principle of social conduct. That boys are the more aggressive, dominant or active sex also appears as a given in the literature. Even Eleanor Maccoby, who co-authored the widely cited book on the The Psychology of Sex Differences (1957), has reneged on her once famous finding that there was only equivocal evidence to support the assumption that boys were the more

active sex. In a fairly recent article on Maccoby herself, Hall (1987) states that:

> ...based on new analyses that show significant differences, Maccoby now sees it as "well-established" that boys are the more active sex. (:60)

But as the following section shall discuss in more detail, much of these "new analyses" have continued in the tradition of documenting differences, traits and tendencies as well as their social consequences without documenting how these social arrangements are produced and maintained in everyday interactions. For this reason, symbolic interactionism will be used as the theoretical orientation of the present research on gender influences in the classroom interaction of young children using computers.

III. Theory

A theory is "an interpretive structure that renders a set of experiences meaningful and understandable; may be lay or professional, always derives from the cultural understandings of a group" (Denzin, 1989:144). A review of the literature on any social phenomena may be considered as a preview of the cultural understandings of the group[5]. In the present context, each interpretive structure thus views the patterns and relationships of children to environment in a slightly different way. Moreover, we may expect different conceptions not only of human behavior in general but also of child development and childhood socialization. The review of the literature on gender influences in the classroom interaction of young children using computers must therefore suggest some general cultural understandings about these matters.

The perception that children go through a series of orderly, sequentially linked stages of cognitive and physical development represents one of these general cultural understandings depicted in the literature. That

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5 The "group" is not defined here because that depends on the degree to which the theory/research reflects the cultural understandings of a broader group. Ideally, theory should embody the meanings and understandings of the larger group - society, and better yet, the whole human group.

gender and sex[6] are quite central to this process is well understood.

Gender and sex, which properly fall under the rubric of human sexuality, also claim a share of the cultural knowledge. It begins with lengthy observations of biological differences, followed by extensive literature on the social, emotional and psychological differences between the sexes. A causal connection was made between the two (bodies and traits) and henceforth an everlasting preoccupation with the social consequences of these biological differences was created. The women's movement made an heroic attempt to break this causal chain which seemed to promote the notion of biological determinism. Indeed, it was instrumental in developing the notion of gender as socially constructed. Because such social consequences as sexism and discrimination were no longer seen as inevitable, the doors were opened to responsible, self-determining behavior guided by the realization that we have in fact created our own social consequences. Taking part in this process, School Boards everywhere have aimed at reducing sex bias in education. The success of these efforts could, however, be handicapped by the cultural misunderstandings embodied in the literature.

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6 The concepts "gender" and "sex" are often overlapped and used interchangeably. In this paper, Goffman's (1977:303) definition of gender shall be used: gender refers to sex-specific ways of appearing, acting and feeling. Sex shall mean the biological categories male and female.

A Perspective on Gender Differences

Goffman (1987) asks us to go back to this presumed relationship between biology and social consequences and change the focus of inquiry. He asks us to consider how these "very slight biological differences" are identified as the grounds for the social consequences attributed to them, suggesting that this requires "a vast, integrated body of social beliefs and practices, sufficiently cohesive and all embracing" (Goffman, 1987:52). In claiming that these biological differences are "very slight" Goffman (1987) is jumping on the feminist's anti-biology bandwagon.[7] The point, however, is to question how any biological differences are used as the basis for the social construction of what Goffman (1977) calls "two sex-classes" in virtually every society.

> It is not, then, the social consequences of innate sex differences that must be explained, but the way in which these differences were (and are) put forward as a warrant for our social arrangements, and, most important of all, the way in which the institutional workings of society ensured that this accounting would seem sound. (Goffman, 1987:52)

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7 It is a popular trend in some factions of the feminist literature and to a lesser degree, in the interactionist literature to minimize the role of biology in an effort to bolster the notion of the "social" construction of gender and similarly to attack the biological determinist position. This attack on the body is unnecessary and may lead researchers in their offensive stance, to ignore an essential element in the whole social process, human bodies. The lack of recognition that the "social" is really "social bodies" may constitute one of the most serious shortcomings of almost all social research.

That very little research has attempted to discover the symbolic and processual nature of these phenomena, suggests that a serious cultural misunderstanding exists in the literature. Such cultural misunderstandings may explain the theoretical apathy evident in the mass of research which contributes very little to the formulation of generic principles of social conduct (Couch, 1988). That all social research should aim at formulating such principles is forcefully asserted by Blumer and other interactionists[8].

An Understanding of Children

The interpretive structures or theories that have traditionally been used in seeking to understand children have been psychological theories (especially Freud, Erikson, and Piaget) elaborated sociological theories of socialization (Waksler, 1986:71) or developmental theories, especially cognitive social learning and cognitive developmental theories such as that of Kohlberg (Roopnarine and Mounts, 1985:14).

In varying degrees, these theories share some common beliefs about children that influence the nature of their enquiries. Most of these theories share a point of view

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8 That many symbolic interactionists are rather indifferent to, or misguided by, this crucial element in Blumer's epistemology is discussed by Carl Couch in a paper presented at the 1988 Annual Qualitative Research Conference at the University of Windsor, Ontario.

about children which sees them as passively subjected to anatomical and/or environmental forces that shape or determine their behavorial styles and abilities. Today the process of development is conceived of in a less mechanistic manner than earlier theories. Positive and negative reinforcements, imitation, role modelling and "anatomy is destiny"[9] are no longer found to tell the whole story about child development. Indeed, children have been given a cursory role in their own development. This role is generally not significant enough to alter the "orderly progression of the child (physically and mentally) through a series of sequentially linked stages or phases" (Denzin, 1977:8).

The Interactionist's Conception of Children

Symbolic interactionists perceive that children have more than a cursory role in their own development. Denzin (1977) says that this orderly sequence "is taken as largely irrelevant for symbolic interactionists. Instead, the concern involves an understanding of how the object called 'child' comes to enter into the very processes that produce and shape its own self-consciousness and awareness of others" (:10). This represents a much more active view of

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9 "Anatomy is Destiny" is a commonly used expression which is used to refer to Freudian Psychological theories. It is a colloquialism which does little justice to Freud's insightful work.

children in attributing to them a substantial role in their own development. Denzin (1977) tells us that the child

> ... can enter into the organization of its own developmental sequence, bypassing certain stages, regressing to others, ignoring still others, and perhaps creating stages or phases that have yet to be imagined... The interactionist, then, eschews a strict developmental approach and prefers instead a naturalistic account of the growth and emergence of self-awareness and self-consciousness in childhood. (:10)

As conceptions of childhood have changed historically and culturally (Aries, 1962), symbolic interactionism may offer a conception of childhood which is different from the more traditional approaches to children's studies. By making children's experiences directly accessible to the reader with a focus on the children and the meanings they give themselves and their life experiences, researchers become open to recognizing their unconscious pedagogy and exposing their conscious pedagogy as well. Unconscious pedagogy refers to those motives, intentions and needs of adults and educators of which they are not aware, yet which nevertheless influence the pedagogical relationship. That our interpretations, judgements and assumptions about children could be based on faulty or incorrect understandings is relished by interactionists who take their sociological subjects quite seriously, even if they are children (Denzin, 1989).

Waksler (1986) argues that taking children seriously as sociological subjects "makes it possible to draw on social

science resources not usually applied to children" (:71). Much of the previous research on children exhibits a "clear reluctance to take children's ideas seriously" (Waksler, 1986:72) and this is evident by the absence of children's explanations. He points out that this absence of children's explanations is rarely missed because its very existence is not recognized (1986:71-73). There are thus two fundamental biases found in the literature that particularly distort children's worlds and should be suspended from the research enterprise. These are:

> 1. Children are unfinished, in process and not anywhere yet.
>
> 2. Children are routinely wrong, in error, and don't understand. (Waksler, 1986:73-76)

The distortion of children's worlds comes from a point of view which defines children in terms of adult skills and behaviors that they cannot do. In other words, they are measured on a spectrum of adult qualities. Waksler (1986) suggests that the distinction between adult and child may become irrelevant as we come to focus on varieties of knowledge rather than evaluative, comparative and judgemental notions of knowledge. Focusing on varieties of knowledge permits a definition of childhood and a research stance that questions adults taken-for-granted common sense notions of childhood. This is so because symbolic interactionism assumes that children are "by nature social and capable of acting in social worlds, and indeed can

create and sustain those worlds in their own terms" (Waksler, 1986:75).

It is the presumption of social competence that characterizes the interactionist perspective, but a different variety of social competence than that thought to be characteristic of adults. Waksler (1986) claims that the adults' insistence that children are socially incompetent reflects an ideological position rather than a scientific fact. Actually, these claims can be seen as "political moves to control children and turn them into adults, whatever 'adult' turns out to be" (:75).

When considering this process as ideologically biased by adults in their perceptions and power to enforce these perceptions, we can view the socialization process from a different angle:

> ...[W]hat is called socialization is a far less certain and fundamental process than is commonly imagined. If it is a fully interactive process, with participants engaged in a struggle rather than a one-sided helping, leading, nurturing, rearing relationship, what emerges is the strong likelihood that it may *appear to work* far more than it indeed does. Consider that the process of socialization entails not children becoming adults but learning to act like adults...The unsettling aspect of this consideration is, of course, that there are no adults, only adult actors - a sociologically plausible but common-sensically disorientating idea. (Waksler, 1986:75)

The interpretation of children's behavior in adult terms thus serves as a mode of socialization itself, rather

than of understanding (Waksler, 1986:76). Interactionist research therefore aims to interpret children's behavior on their terms which has significant implications both methodologically and theoretically.

> Socialization, from the standpoint of symbolic interactionism, represents a fluid, shifting relationship between persons attempting to fit their lines of action together into some workable, interactive relationship ...is a never-ending process that is negotiated and potentially problematic in every interactional episode that appears between two or more individuals (Denzin, 1977:2-3).

Denzin stresses the importance of taking children seriously and attempting to understand them on their level. Additionally, he encourages us to conceptualize them as capable of minded, self-reflexive behavior and not as passive participants in socialization (1977). The view of children as passive participants in the socialization process is depicted by the abundance of research which, as Waksler (1986) has pointed out, virtually ignores children's explanations. Not only have children's explanations been overlooked, but so have research methodologies and theoretical analyses that perceive children as socially competent, interactive and active in their own socialization. Interactionists do not see children as passive participants who are socially produced but as active participants who are the co-producers of their own selves and social worlds.

The interactionist position encourages methodologies and theories which question socialization processes and theories of child development, especially as these are articulated in our system of educating children. In his book on Childhood socialization, Denzin (1977) articulates this position quite clearly.

> It is time to call into question America's theories of children and child development. It is my intention to discuss how society's theories of childhood and adulthood become entrenched in the ways it educates its children. (:16)

> The interactionist view of child development, which is my position, argues that neither age nor sociostructural variables such as race, religion, and ethnicity will directly call out fixed responses or developmental skills in childhood. Rather, it is the nature of the interactive experiences children are exposed to that shapes their behavioral styles and abilities. (:21)

What symbolic interactionism offers to the study of children is a research stance or point of view that involves a different definition of children, and one committed to understanding children in their own terms. The nature of their interactive experiences is seen as primary in shaping their behavioral styles and abilities. Traditional research approaches to studying children have utilized theories of socialization and child development which have ignored children's perspectives and have viewed children as passive participants in their own socialization. Methods of measuring and interpreting this research reveal observations framed in evaluative and comparative adult terminology. The opportunity to examine child development and socialization

from the symbolic interactionist's perspective may contribute to a broader understanding of not just children's social conduct, but all social behavior.

A Theory Examines Itself

At the same time, the symbolic interactionist perspective intends to contribute to the refinement of the theory itself. The interactionist's conception of the research process reveals itself as a highly reflexive and dynamic system. The objectives of theory, which are to "provide explanations, generate new images of reality, new hypotheses and new propositions and move sociologists toward the goals of explanation and prediction" (Denzin, 1970), apply to both the empirical world and the world of theory simultaneously. That a great deal of social research is blind to the intrinsic duality between theory and research is discussed either implicitly or explicitly by many reasearchers (e.g., Cicourel, 1964; Denzin, 1970 & 1978; Blumer, 1969; Homans, 1964; Couch, 1988). Every research act is an opportunity to examine not only the concepts as they exist empirically but also the descriptive concepts in the conceptual scheme of the theory. Blumer (1969) tells us that scientific analysis requires a "meticulous examination" and inspection of the concepts or analytic elements used in the research process. He offers the following prototype of

"inspection": this is the image represented by a child's[10] handling of a strange physical object (cited in Denzin, 1978:33). The child is likely to examine this object from all sorts of positions using all the senses, many parts of his/her body and other various sources.

The present research on gender influences in the classroom interaction of young children using computers will focus on children's interactional experiences from the symbolic interactionist perspective. Methodologically, there will be a commitment to using interpretive and analytic devices and terminology that reflect the children's experiences in a manner which is consistent with the methodological principles that symbolic interactionism demands. These principles are outlined by Denzin (1970:19) and suggest that the present research cannot be considered to be a "complete study" because "symbols and interaction must be brought together before an investigation is complete" (:19).

This study is specifically focused on the interaction or behavioral level of interaction. The symbolic analysis is somewhat limited because the observation was non-participant and no interviews were conducted. However, the videotapes provide a rich source of the symbolic and processual nature of the interaction process. The present research involves

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10 In this example, Blumer uses the term "our handling of a strange object" which I have replaced with the child's handling of a strange object because it depicts the more creative, flexible, imaginative nature of inspection that Blumer discusses.

an observation and analysis of the interactive behavior as a prerequisite for future research involving the symbolic sphere. Since the traditional approaches to studying children have not used the observational methods and interactionist perspectives, this research represents an attempt to bracket or isolate the essential features of the process under examination from a symbolic interactionist perspective.

The various lines of reasoning developed in the above review and theoretical discussion can now be drawn together to formulate the following hypotheses. These hypotheses embody two essential theoretical understandings: first, the view of children as active participants in their own socialization, and second, the view of gender as socially constructed.

1. If girls and boys in the early elementary grades have experienced and actively participated in gender stereotyped socialization, and they have identified with and in consequence, have accepted such gender identities, they will show different behaviors and patterns of interaction to confirm and express those identities.
   (a) Boys will exhibit more aggressing behaviors than girls during computer activities with mixed-sex and same-sex groups.

(b) Girls will exhibit more cooperating behaviors than boys during computer activities with mixed-sex and same sex groups.

The use of the terms "cooperating" behaviors and "aggressing" behaviors stresses the importance of making "social acts" the units of observation, rather than individual traits or characteristics. As such, to examine aggressing or cooperating behavior, and not the behavior of aggressive males, or cooperative females, suggests that "we are starting out with a given social whole of complex group activity, into which we analyze (as elements) the behavior of each of the separate individuals composing it" (Mead, 1962:7).

IV. Methodology

The Selection Of Social Units for Observation

This research involved the use of a multi-stage sampling method in which the technological organization was considered first and the selection of children within these schools represented the second stage of sampling.

A School Board in Southern Ontario provided a list of 12 classrooms judged by its administrators to use computers in the classroom to a significant extent. All 12 classrooms were visited and there was a substantial amount of variability found in computer use and technological organization. Therefore, purposive sampling was used to select two classrooms with similar uses of computers and one with a different approach for comparative purposes. All three classes chosen were composed of grade 1 and grade 2 students (ages 6-7). The two types of computer use that were considered to be similar involved the use of 2 PET Commodore Computers as an Activity Centre and the regular use of a bank of computers called the Computer Lab for use by the whole class at the same time. The third classroom involved a different set-up of the computer bank idea and was not included in the present study because the manner in which computers were used would have required a completely

different set of coding categories for the recording of observational data.

The use of nonprobability sampling procedures was relevant in the present research context for two reasons, one of which related to the significant amount of variability found in computer use at the schools examined. In order to examine the behavioral differences and interactional patterns of boys and girls at the computer, the technological organization and computer use had to comprise a consistent situational frame between classrooms.

Secondly, the subject of interest to the researcher played an important role in the determination of the research design and sampling method. The present research is quite specifically concerned with gender and its influence on the classroom interaction of young children using computers. Therefore, prime periods of interaction where observations could be made on a similar temporal basis were most useful.

At the second level of sampling in this study, it was decided that the interactive sampling unit would be the social group as found in various forms at the computers, which effectively included the whole population in each classroom. At both locations the children were permitted to use the computers on a voluntary basis during activity centre time and all children had to use the computers during the computer labs.

The Observation of Social Units

An observational method was used as the primary source of data collection for this research. An observational method is defined as "the selection, provocation, recording, and encoding of that set of behaviors and settings concerning organisms 'in situ' which is consistent with empirical aims" (Weick, 1985:360). The observational method used was nonparticipant and overt in a natural setting. The researchers videotaped children using computers in both classes on select occasions for half of an academic year.

The method was semi-structured in the sense that only certain time periods were chosen for observation. In this manner, the element of "selection" in Weick's (1985) definition may be more clearly understood. First of all, the classroom is an ideal setting for observational study because it imposes some natural boundaries by way of age groupings and situational constraints relating to the educational routine. Furthermore, this research involved "selecting" the times of the day when children were scheduled to be involved in Activity Centres and Computer Labs as times for observation. Although children did use the computers throughout the day, this use was unpredictable and not as frequently occurring. Therefore, in order to enhance the observational data, optimal times were selected

in which it was known that there would be more extensive computer use. A total of 37 activity centres (AC) and 12 computer labs were videotaped for two schools.

The activity centres (AC) and computer labs (CL) involved approximately 55 minutes of use by the students and this period represented the approximate number of minutes of videotaping by the researchers. The total number of hours of videotaping for both the activity centres and computer labs is 45 hours.

Since the method employed was a nonparticipant method, gaining rapport was not required or encouraged. In order to reduce observer interference in this setting, the observers were instructed never to initiate communication with the children, although at the beginning of the project it was required that the observers answer a few questions which the children posed. The answers given by the observers were brief, polite and informative. It was relatively easy for the observers to remain unobtrusive in this environment because the use of children for observational subjects reduces problems of interference. Schoggen tells us that "[c]hildren are simply too busy living their lives to be bothered with an observer who merely stands and watches" (cited in Weick, 1985:364).

The research design of this project further entailed the collection of other sources of data to enhance reliability and validity. Multiple methods and diverse data

sources are essential for building behaviorally grounded theories. Symbolic Interactionists refer to the use of multiple methodologies as triangulation. The use of triangulation is an admission that the process of doing research is a human act, in fact a social act no different from the social acts being studied. The research act involves the process of going from the realm of theory to the empirical world and back again. As an inherently human process, this involves limitations, perspectives, decisions and judgements, as well as methodological and theoretical constraints. Consequently, the greater the triangulation, the greater the confidence in the observed findings.

Apart from field-notes and videotaped observations, the following data sources were collected but not analyzed in the present research: (a) The work the students did on the computers; (b) The grades students received on computer activities as well as overall grades; and (c) Sociograms given to all students at the end of the project to indicate friendship patterns and choices of partners for academic and non-academic tasks. Although the present research does not report findings and analysis on the sociograms and student's work, these data were used primarily as methods of examining relationships and patterns found after the coding was done. The students' grades are discussed briefly in the Findings section on the Classroom Organization, which follows this chapter on Methods.

The Measurement Process

Gender or sex is one of the more commonly used examples of a nominal level of measurement (e.g. Babbie, 1982:85; Bailey, 1987:61). The requirements of a nominal level of measurement are that "there be at least two categories (or else it is not a variable), and that the categories be distinct, mutually exclusive, and exhaustive" (Bailey, 1987: 61). As a nominal level of measurement, gender or sex is a precise measure for classifying human beings into two physiological categories. In other words, the nominal categories of gender as male or female refer only to the biological sex of the individuals being observed. Degrees of masculinity and femininity, although theoretically interesting, do not apply in this context. Furthermore, current debates over the two-gender system of classification do not pertain to research on children, since it is virtually unheard of for children to be transsexual or transvestite.

The operationalization of the concept aggression is not quite so easily accomplished. The designation of an act as aggressive involves some type of judgement by the researcher. Some of the recent literature has made a distinction between two types of aggression - "that between 'angry' and 'instrumental' or what some have called

'annoyance motivated' and 'incentive motivated' aggression (Howells, 1985:15). Aggression has been defined using a variety of similar elements. For example: as forceful actions intending to dominate or hurt; hostile, injurious or destructive behavior; unprovoked violation or attacks; combative readiness; driving forceful energy or initiative; assaults and offensive actions. Other definitions focus on elements of intentionality, types of aggression and parts of the self where aggression is thought to be located or "guided by" as in the following:

> In contemporary (cognitive) social psychology texts, it is customary to define aggression as behavior that has the purpose or goal of harming another. In contrast, the sociobiological approach defines aggression in terms of overt behavior, without reference to purpose. From the personalytic [sic] perspective, there is no reason to confine aggression to just one of these two definitions. Harming behavior can be deliberate and purposeful (guided by the self-system) or emotional and impulsive (controlled outside the self-system). (Suls and Greenwald, 1982:167)

The question of which "self-system" guides or controls aggressive behavior poses some interesting and challenging theoretical notions that do not directly pertain to the scope of this research. Nevertheless, there are some more basic components to the concept of aggression that are relevant in this research context. The meaning of aggression appears to encompass a number of related phenomena. First of all, aggression must be felt by someone. Secondly, the feeling is one of pain, harm, threat, or violation. This feeling is not necessarily one of physical pain. Finally,

there is an attribution of intentionality by the one feeling the aggression to the one doing the aggression. The attribution of intentionality represents the most complex aspect of the meaning of aggression. Some aggressive behaviors are clearly intended to hurt or inflict injury on another. Still others appear to be self protective and/or self-assertive. However, to say that this behavior is incentive motivated or annoyance motivated is a difficult connection to make. Indeed, such a connection can only be made when the researcher has thoroughly verified this interpretation through in-depth interviews and observations of the subjects. Aggression is a socially created and interpreted behavior between a subject and an object. The meanings of aggression are further complicated by the fact that both the subject and the object may have different interpretations of the aggression and either one or both may be unaware of what aggression means to them.

The researcher is then left with his or her own meanings of aggression and the conventions of past research to guide current research and the research of the future. Due to the ambiguity surrounding the concept of "aggression" in past research, a decision was made to extract categories from the empirical data rather than derive these categories from theory.

Three categories of aggression were extracted from the data and used in this research. These are: direct physical

aggression, verbal aggression, and physical aggression mediated through the equipment. Behaviors such as pushing, shoving, hitting, grabbing, as well as such screen and keyboard related behaviors as blocking the keys, are used as indicators of direct physical aggression. Verbal attacks, demands and commands are also recorded as indicators of verbal aggression. Such subtle forms of behavior as angry glances and passive aggression, although noteworthy, will not be used as indicators of aggression due to problems of reliability in coding.

Similar logic is applied to develop an extracted definition of cooperation. Like aggression, "cooperation" appears to have an existence of its own, easily commanding a precise and factual definition that would yield unanimous consensus. In other words, there is an "everyday" understanding or idea of aggression and cooperation that most individuals could relate to, refer to and interpret. However, it is the symbolically created and interpreted aspects of these concepts through the interaction of individuals that permits the "idea" of these as appearing to exist outside the interaction. The interactionist perspective requires that this reflexive process between the concept and the interaction which creates, maintains and changes the concept, be exposed during the preliminary phases of the research. Consequently, the researcher remains open to new definitions and revising old ones.

Bales' (1950) first six categories[11] were initially used as sensitizing concepts for cooperation. Some categories, particularly relevant to the children in this setting, have been extracted from the data and some of Bales' (1950) categories have been collapsed. For example, Bales' (1950) three categories of "gives suggestion", "gives opinion" and "gives orientation", have been collapsed into one category of offer help (verbal). As sensitizing concepts for the broader concept of cooperation, the following behaviors shall be used: Ask and respond to questions and offer verbal and physical help.

Applying the principles of triangulation to the social units selected for observation, a combined measurement strategy has been adopted. Although the collected observations permit theoretical analysis, it is understood that no single measurement class can yield all the relevant data for a theory (Denzin, 1970). Therefore, both quantitative and qualitative measures will be used.

Qualitative Measures

The qualitative analysis used in this study is composed of two sections describing first the classroom organization,

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[11] Bales (1950) first six categories are: 1. Shows solidarity, raises other's status, gives help, reward; 2. Shows tension release, jokes, laughs, shows satisfaction; 3. Agrees, shows passive acceptance, understands, concurs, complies; 4. Gives suggestion...5. Gives opinion ...6. Gives orientation...

and second, the behavioral sequences within the classroom. A thick description of the interactional environment, using behavioral specimens, details some of the experiences, language, and patterns of body spacing, role playing and physical contact in the interactional environment. This description of the interactional environment contributes to the validation of the quantitative scales and to the verification of theory. Denzin (1970) reminds us that a false dichotomy exists between qualitative and quantitative data and that the tendency to turn to quantitative data alone to verify ones theory is unnecessary.

Quantitative Measures

Cicourel (1964) suggests that this tendency to turn exclusively to a quantitative measure of social processes is "measurement by fiat" and that precise measures of social processes "require first the study of the problem of meaning in everyday life" (cited in Denzin, 1978:114). The implicit assumption in creating measurement scales is that the observation of the concepts selected for study "can be transformed into statements concerning the degree to which a concept (or aspect of a concept) is present or absent in a given empirical instance" (Denzin, 1978:10). Depending on the level of conceptual analysis this transformation process can be the most challenging part of the research process.

In the case of interval level data, such a transformation is more easily accomplished and rationalized. Cicourel (1964) explains this in terms of interpreted and uninterpreted axiomatic systems. Interval level data have a direct correspondence with the uninterpreted axiomatic systems such as mathematics and statistics used in all quantitative analysis.

The concepts of aggression and cooperation selected for observation in this study are nominal level scales and do not yield so easily to the transformation process. The question of how one can reliably know that the numbers assigned to certain aspects of behavior actually represent those behaviors, requires careful and thorough scale construction. The following section will describe how the coding categories were created, derived, constructed and stumbled upon. Indeed, the research "act", as Denzin (1970) describes it, reveals itself as a creative and reflexive process where the researcher moves from theory to methods to the empirical world and back again.

The Construction of Coding Categories

A random selection of tapes were viewed with the sole purpose of identifying and observing behavioral patterns around the computer activities. The task was one of general orientation to verbal and non-verbal behaviors, especially

as they related to the computer activities. A total of 15 categories of behavior were created, which were initially and rather naively thought to encompass all theoretically significant behaviors. The trial coding procedure revealed a number of interesting methodological insights. Number one, the researcher begins with a very vague sense of what the sensitizing concepts actually mean. Number two, the number of behaviors one can actually observe during a coding session is a humbling experience. Finally, one somewhat disorienting question dawns on the researcher: where in the world did I get these categories from?.

From these insights, one can take an abstract and rather academic understanding of methodological principles to a much deeper level. For example, the sense that the researcher begins with only a vague understanding of what concepts actually mean suggests that there are a vast number of possible indicators for every concept, and that the relationship between indicators and the concept is in no way absolute, i.e., that the espistemic correlation remains problematic. It also follows that there must be a theoretically relevant and grounded connection between the concept and its indicators. That the number of behaviors one can actually observe during a coding session is rather limited, alerts the researcher to the active process of having to select and attend to some behaviors to the exclusion of others. The question of what to "leave out" may

raise fears of doing a grave injustice to the richness of the behavior observed. Hence, the decision of what to "leave in" becomes one of determining what appears to be the most theoretically relevant. The third methodological insight, asking where the "categories" came from, points directly at the researcher's own frame of reference. Indeed, what is usually a very subtle and reflexive process between symbols and behavior becomes clearly conscious. The researcher is faced with the illusory nature of categories and how they may steer the data into all sorts of directions. The formidable task of creating categories for coding behavior leads the researcher to the safety of past research.

Here connotation of "safety" is not the sense of resting on someone else's laurels, but safety in the the feeling that it can be and has been done. Furthermore, that other researchers have had to make decisions, and that these decisions can now be evaluated in terms of their theoretical relevance, their representation of the empirical instances they relate to and their overall contributions to formal theory, appears to be the proper guide for present research.

Unfortunately, the past research on children's interactions in the classrooms provided little safety. As was mentioned in the review of the literature, very little was done in actually coding children's interactions. The one study found was done by Medley & Mitzel (1958) and measured

such behaviors as hand raising and asking questions. This study measured classroom behaviors and not interactions between students. Past research on adult interactions relied heavily on Interaction Process Analysis (IPA) by Bales (1950) and Borgatta's (1962) revised IPA called Interaction Process Scores. Bales'(1950) thorough discussion on the theoretical development and description of the coding categories has probably contributed significantly to the tremendous dependence on his system. His system is general and broad in application, but so theoretically grounded that one can easily build from it other interaction process systems. The rather dichotomous nature of his set of categories as instrumental and expressive provided a useful basis for the analysis of gender patterns, which are so often described in these terms. However, it was found that a number of the Bales categories did not apply to interactions between children as were observed in this study. Therefore, a number of Bales categories were collapsed. Others were left out in favour of categories that were actually derived from the interactions observed.

The development of coding categories was narrowed down to those behaviors which would best indicate the concepts of cooperation and aggression. The selection of these concepts is theoretically relevant because they are the most commonly cited in discussions of gender differences. That these

behaviors have seldom been coded further supports their being emphasized.

After numerous coding systems were tried and tested on the most rich interactional segments of tape, one system of seven categories comprising four cooperative and three aggressive categories was derived. A number of trial runs were conducted to verify that the coding instrument would yield stable responses over repeated measurements. After all the tapes were coded the first time, the researcher went back to the first few tapes coded, and re-coded them to observe the differences. This was initially done because the researcher felt she was getting better at coding as time went on. As was expected, the frequencies of coded behaviors were lower on the first round of coding than the second. However, the ratios were similar. For example, on tape # 3 at Location #1, one activity centre coded yielded a total of 13 cooperative acts and 6 aggressive acts coded. The second coding of the same segment yielded a total of 28 cooperative acts and 13 aggressive acts. The first round of coding represented the most blatant forms of the behaviors being measured and probably the most easily replicated by another researcher. By the third tape coded for the second time, the coding scores were very close to equal.

At no time, however, were the scores virtually identical, suggesting some reasonable limitations and room for judgement and error. These errors were usually cases

where a behavior was coded as Aggressive Self-Assert(Verbal) in one instance and Aggressive Command (Verbal) in another. This could represent a problem with the development of the coding categories, where these two might have been scored as one Self-Assert/Command as in the case of Physical Aggression. However, the distinction was preserved because in most cases the verbal statements were clear enough to determine if in fact the behavior was self-assertive or commanding the behavior of another. In the case of physical aggression, these two categories were collapsed because it would leave too much judgement on the part of the researcher to determine whether the aggressive physical behavior was intended to be a command, a self-assertive, both or neither.

Another test of reliability was conducted. This involved having an ex-University student code one whole tape. The student was given the description of the coding categories (see Appendix C) and the tape. The student was also asked to make notes concerning questionable codes, problems, or special circumstances and write down all instances of direct physical attacks and verbal attacks. The comparison of this students scores with those of the researchers yielded an almost unanimous parallel on all aggression scores. There was, however, a significant difference in the cooperation scores, where the student scored many more times than the researcher. It was later realized that in instances where it looked like there might

be cooperation, but not enough verbal evidence to verify it, the student opted to score it, and the researcher opted not to do so. The classroom where this particular tape was observed showed very little verbal interaction because it was not permitted by the teacher. The student felt obligated to find some evidence of cooperation, even if it meant inferring a lot from very little non-verbal and verbal exchanges. Given that this student had a very brief training period and virtually no experience at coding, the researcher felt that the comparative results were quite satisfactory and that the coding system developed would provide theoretically useful representations of the empirical situation being observed. The description of the coding categories may be found in Appendix C.

Quantitative Data Analysis

The level of variable observations and the coding system used to measure these determine the level of quantitative analysis permitted. In this research three nominal scale variables are examined: gender, cooperation and aggression. For the purpose of quantitative analysis, all data collected during the observational period were used. They therefore constituted a population of all children in the classes who chose to use the computers

during activity centre time in the course of half of an academic year.

The chi-square (X^2) test of independence was used to examine the relationship between these variables. Because it is not a normed measure of association, chi-square is not a very useful measure of the degree of association between nominal variables, but is useful in detecting whether or not an association exists (Loether and McTavish, 1980). The chi-square test of independence addresses itself to whether the observed frequencies resemble those that would be obtained if X and Y were actually independent (Horvath, 1985).

Chi-square tests of independence yield either a significant or non-significant statistic. What significance actually means is simply that the result has a low probability of happening by chance. When we select the traditional confidence level of .05, we are saying that the probability that sampling error alone would produce the given result is five percent. A result that is significant at .001 is therefore more significant than .05. In cases where we have a significant chi-square result, we are then permitted to reject the null hypothesis which says that X and Y are independent of each other. However, rejecting the null hypothesis is another way of saying that sampling error had a low probability of producing the observed result. The discussion of association between X and Y must depend on the differences between the observed and expected frequencies

and the patterns and directions of association found. But, rejection of the null hypothesis is not considered proof that the independent and dependent variables are related. It is considered evidence that there is a relationship. Likewise, when we retain the null hypothesis, this does not constitute proof that X and Y are unrelated, only that the relationship, if any, was not demonstrated under the conditions of the particular research (Horvath, 1985).

There is one limit to chi-square which forces the collapsing of categories of data. This is that chi-square must have a minimum cell frequency of five in all cells of the table. When the cell frequency falls below five, the chi-square statistic will be higher than warranted. In these cases, Yates Correction for chi-square tables was calculated and this had the function of lowering the chi-square statistic. The methodological problems associated with collapsing categories and creating new categories, such as "high" and "low" aggression, are discussed in the next chapter on Findings.

V. FINDINGS

The following section is organized into three main subsections. The first two on Classroom Organization and Behavioral Sequences are qualitative descriptions, and the third presents quantitative tables on aggressive and cooperative interactions. The first two sections are conceptualized as a rich contextual foundation for the quantitative data that follow.

Classroom Organization

The classroom is composed of various structures, activities, and objects which frame the interactional processes. How these phenomena might combine to influence early cognitive and socialization processes is essential for understanding both the "visible and invisible pedagogic relays"[12] inherent in an educational setting. This section will discuss the classroom organization found in the Activity Centres and Computer Labs for both classrooms used in this research. Sinse the classrooms are found in two different schools, the convention of referring to them as Location # 1 and Location # 2 has been adopted.

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12 Borrowed from the title of Basil Bernstein's paper "Visible and Invisible Pedagogic Relays and the Construction of Objects and Subjects" presented at a conference on The Socio-semiotics of Objects: The Role of Artifacts in Social Symbolic Processes, Toronto, June 23, 1990.

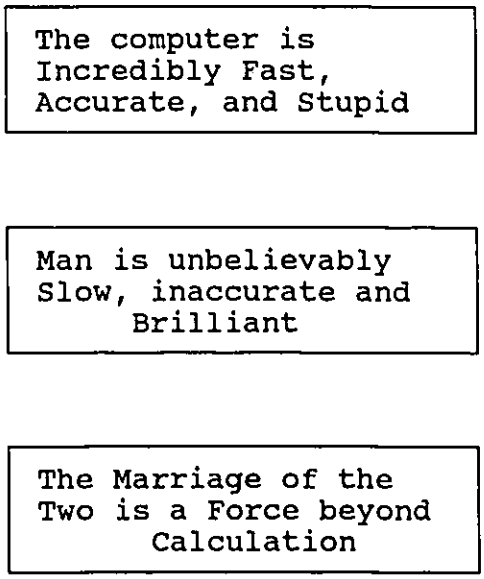
There are some distinct features about activity centres that differentiate them from the more academic curricular time slots in the organizational routine. This special type of educational activity is geared only to the early elementary grades and is a remnant of the early theories of kindergarten which aimed at providing a rich and varied set of play experiences that were at the same time educational. During activity centre time students move around the classroom to play at various centres such as "dress-up", "puppets", "kitchen", "mathematics", "listening", "water play", "games", "puzzles", "building" and "crafts". This is a time for the children which is characterized by more freedom, more movement and limited or no structured formal lessons. Consequently, there is more opportunity for conflict between children and between children and teacher.

For example, observations of activity centres reveal that the children often share similar preferences for a limited number of activities which not only conflicts with the teachers mandate to get the children involved in a variety of educational experiences, but is also the source of disagreements between children wishing to do the same thing. How the teacher handles these conflicts and structures the activity centre time is a matter of personal pedagogic strategy. The author's son Jordon revealed an interesting story about such conflicts. The class was pre-kindergarten, and the teacher had decided to designate a

certain number of medals for each activity centre to control the number of children in each and to direct the course of their activities. Jordon related a *verbatim* account of how all the medals for the blocks activity were taken and children were grabbing medals from each other (to claim their right in this activity centre) and fighting. The teacher removed Jordon and a few others and gave him the medal to go in the kitchen. He didn't want to go in the kitchen and preferred instead to play Ninja Turtles (which was not an officially sanctioned activity, but could be improvised sneakily in the blocks area). The ensuing power struggle resulted in Jordon having to choose either the kitchen or a quiet time on the floor. He chose the latter. I reminded Jordon that Ninja Turtles love pizza, and that pizza must be cooked in the kitchen. This helped him manage the conflict between his interests and the imperatives of the class. On future occasions, he gladly went into the kitchen, but only to make Ninja Turtle Pizzas. Upon a subsequent visit to his class, I noticed that the teacher had surrendered to the Ninja Turtle fad and had in fact put life-size pictures of the four Ninja Turtles in the kitchen, thus attempting to "get the boys in the kitchen" and promote cross-gender play activities. The creation and structuring of these "activity centres" may therefore be interpreted in terms of gender relevance and sex-bias in educational settings.

The kinds of activities provided may also be examined in terms of their cultural meanings. That each activity is centred around a variety of cultural objects and artifacts presents the observer with a variety of implicit agendas and meanings revealing both cultural and pedagogic objectives. That the computer is a valued cultural object is expressed to the children in one class with three signs above the computers on the wall:

Illustration 1: Creating Meaning for Cultural Objects



Activity centre "time" or period has different meanings for teachers and students. Children in the activity centres observed appeared to perceive this period of the day as "fun time" or "free time". From casual interviews with teachers at five different local schools, it was observed that teachers perceptions on activity centre time may vary

significantly depending on how well they enjoy "free time" and on how well the children behave during this period. While some teachers may perceive activity centre time as "break time" (i.e. break from formal teaching), others may find it to be a bothersome imperative in which the classroom control structure is weakened. Although this may indeed occur, the teacher can similarly use this time to gain control. As such, it is an effective control mechanism for classroom management. Somewhat like recess, activity centre time represents a treasured part of the educational routine for children, and thus a powerful control mechanism for teachers. The threat to end French class has nowhere near the same impact as the threat to end activity centre time. For example, in Location # 2 of this study, the teacher was heard threatening to end activity centre time if the noise level did not drop significantly. This threat resulted in an immediate response of very quiet interactions between the children. In Location # 1 of this study, the teacher used an extended activity centre time as a reward for good behavior. The degree and frequency to which this control lever is used may reflect, in part, the overall classroom organization, the teacher's personal teaching style and the behavioral patterns of the children, especially as they are shown in power and control relationships between children and teacher.

The effects of structure on behavior emerges as an important variable to consider in the classroom setting. Huston and Carpenter (1985) provide some insight into the effects of high and low structured environments and activities on children:

> Highly structured environments or activities may encourage children to fit into structures provided by others, play according to established rules, follow instructions, and allow control by others. High structure is expected to cultivate compliance to adults, seeking recognition and approval, requests for help, and proximity seeking. Low structure, by contrast should encourage children to create their own structure. If there are few guidelines about how an activity is performed, then the child must decide what to do and how to do it. In such settings, therefore, they are expected to be active and assertive, to devise their own rules or procedures, to take initiative, and to attempt to exert control. The behavioral manifestations of creating structure are leadership attempts, aggression, independence, initiation of social encounters, initiation of new components in the play activity, and novel use of materials. Children in low structured activities are expected to be more peer-directed and less adult-directed than children in high-structured activities. (Huston and Carpenter, 1985:147)

In the present study, the two social settings observed parallel Huston and Carpenter's (1985) observations of high and low structured environments. However, the term "low structure" may be misleading in that it could refer to the same kind of "structure", but one which is used or implemented to a different degree. Furthermore, the term "low structure" could be interpreted as no structure, or no control, when what is actually meant by "low structure" is simply a different kind of structure. Because different

structures may embody different meanings, roles, perceptions and values, it may be more revealing to try and identify the kind of structure being used, rather than the degree of structure be used. This approach might advance an understanding of the socially constructed character of all structures.

In order to contrast the pedagogic structure of the two classrooms observed, the illustration which begins on the following page shall present these on a number of similar dimensions.

Illustration 2: Two Types of Classroom Organization during Activity Centre Time and Computer Lab.

Classroom with Low Structure	Classroom with High Structure
Authority	
Although the teacher has exclusive authority in the classroom, there is room for a tremendous amount of variation in how this authority is exercised, enforced, and experienced by both the teacher and the students. In this classroom, the teachers authority appears to have been based on respect, trust, position, adult status, and expertise. The authority does not function to keep a great distance between the teacher and students. This was evident by the fact that she was quite approachable, for curricular and personal needs. Often this teacher had a group of children clustering around all eager to share some interesting bit of information with her. This sharing was a sharing of the self, and not generally approval or recognition seeking. Not only could she be approached, but students felt comfortable enough to reason with her, present their views and discuss ideas. The teachers role in this classroom was multifaceted. She was a referee, a resource person, a leader, an educator, an organizer, and a nurturing and friendly role model or significant other.	In this classroom, the authority appears to have been based on position and power. It was observed that this teacher is an "unquestioned" authority . The children approached the teacher only when absolutely necessary, in most cases when another student had violated their rights. Although such violations where quite infrequent and relatively minor, the students did not show any interest or ability in solving the problems on their own. They always went to the teacher who would issue an order, a directive or discipline to resolve the matter. On other occasions when the children sought the attention of the teacher, they were either seeking approval for following the rules, or pointing out that another individual was not. In this classroom there were no instances observed when students questioned, reasoned or argued with the teacher. The teacher's role in this class appeared to be that of educator and controller.

Classroom with Low Structure	Classroom with High Structure

Rules

The only rule enforced by the teacher on a regular basis was that of turn-taking at the computers. Other than that, the classroom activity centres and computer labs seemed to proceed without reference to the formal or informal rules. The children were permitted to change the software as often as they wished. There was quite a variety of programs used throughout one class and throughout the study period. The number of children at the computers was not regulated by the teacher. This seemed to be determined by the students and the software being used. Generally, there were 2 children at each computer with a number of children frequently watching and joining in for short periods. There were no rules concerning other children helping at the computers.

This classroom had a number of formal and informal rules which were clearly stated on numerous occasions. There was first, a "no-talk" rule, which was used to govern the transition of the children in the reading group to the activities. Then a "talk-but only at a whisper" rule was evoked and consistently enforced. There were also rules about the number of children permitted at the computers. For the first few months of this study, there were two children permitted at the computers, one child at each. Later, this was changed to a maximum of two children per computer. Other children were not permitted to stand around and watch the children at the computers. There were also rules governing the children's interactions with the computer in this classroom. For the most part of the observational period in this study, children were not permitted to change the software or engage in any loading procedures. The same two programs were on the computers for months at a time. For the last month of the academic year children were permitted to change the software, however, because of their lack of experience, they often spent the whole activity period trying to get a program loaded.

Classroom with Low Structure	Classroom with High Structure

Pedagogic Practices to Enforce Rules

The teacher helped the children understand what turn-taking was all about. Occasionally the teacher would stand by the computers and ask students if they were taking turns. She also helped them to place limits on turn taking. Sometimes children did not know when a "turn" was over and another should begin. She also encouraged peer-tutoring at the computer activity,urging those that are skilled with the computers to help the less skilled computer users to understand the mechanics and rules of the program. This teacher showed recognition and approval when children shared their successes with the software or with resolving conflicts. She also used extending the activity centre time as a reward for good behavior. However she was not observed using the threat to cancel activity centre time. On numerous occasions she told the students at the computer that they could continue with their work after recess if they were doing something particularly exciting or creative.	In this classroom, the rules were stated as a directive to the whole class on numerous times. At the end of every activity centre time, the teacher began singing a song which directed the children to do their share in tidying up, and to go back and sit quietly at their desks when they were done. Included in this song, were the names of children that were doing quite well. The teacher was showing her recognition and approval of these children for following instructions and established rules. There were numerous threats used by the teacher to elicit certain behaviors in the children. These threats generally had to do with having activity centre time being over, and having to go to ones desk and put ones head down for the remainder of the class. On one occasion, the teacher clapped a certain beat, all the children responded by clapping back, then proceeded to put their own hands on their mouths, until the whole class was engaged in self-imposed silence. The teacher then instructed the class to take their hands off and keep the noise level much lower.

Classroom with Low Structure	Classroom with High Structure

Social Relations

The extensive interaction between students was characterized by : laughing, peer tutoring, giggling, sharing of scores and successes on the computer, negotiating, bargaining, rule making and rule breaking, assertive and conflictual interactions , playful teasing, independence, physical contact and closeness. There was also a fair amount of heated conflictual interactions that resulted in some physical aggression. However, on virtually every occasion these conflicts were "worked out" by the students so that they continued to work together on the computer.The students showed initiative in conflict resolution and problem solving on the computers. The children who worked on the computers during an activity centre period usually stayed there for the whole period.They were unwilling to let personal conflicts lead them to give up those precious computer seats. By the end of the coding of observational data, the researcher felt that she had begun to know the children in this class, not only by name, but also their strengths and weaknesses on the computer, their friendship patterns and a good sense about the way they present themselves in interactions.

The interaction between students in this class was characterized by whispering and non-verbal gestures.The verbal interactions were so quiet, that the microphones attached to the computers could not pick them up very well. Consequently, the researcher only got to know one child by name (this student was especially skilled on the computer), nor did she get to sense the nature or existence of any friendship patterns or behavioral interaction patterns. Furthermore, because their was such a high "seat" turnover at the computers, the researcher did not have the opportunity to observe the various children's computer skills, with the exception of the one child mentioned above. This student, who I shall call Sandra, appeared to be quite good on the computer and was always offering help in the computer labs. In the classroom, the teacher did not condone her helping role, or maybe her "expertise", and frequently told her to go to her seat, if she was found helping the children at the computers. Occasionally, she would sneak some helpful advice.

Classroom with Low Structure	Classroom with High Structure

Reward Structure

The reward structure in this classroom appeared to be based on self-satisfaction with initiative, independence, level of enjoyment and success at mastery. It is interesting to note that the teachers reward structure, as reflected in grades, yielded at least twice as many A's in overall academic grade, computer grades and interest level than the classroom with high structure. Very few students fell in the C and D range in this classroom. For overall academic, only 5 out of 18 fell in the C and D range. For computer grades, it was 3 out of 18.

The reward structure in this classroom appeared to be based on teacher recognition and approval. Thirteen of the twenty students in this class had overall academic grades which fell in the C and D range. For computer grades, there were eight students with grades in the C and D range. A reward structure based on teacher approval and recognition and corresponding low grades might suggest that children are not as motivated when they are exclusively adult directed in a social setting.

Classroom with Low Structure	Classroom with High Structure
Kinds of Activities	
Dress-up, Puppets, Mathematics Centre, Language Arts, Listening to tape recorders, Games & Puzzles, Writing, Science area, Arts & Crafts, Building Blocks, Play-Doh and clay, Sandbox, Pets (Gerbils) and Computers. There were no structured activities during the activity centre time in this classroom.	The list is almost the same as Location # 1, however, in this class there was no sandbox and no pet. Furthermore, there was a "Reading" activity, in which the students of one grade had to sit in the corner with the teacher and read a story.
Arrangement of Objects	
The students' desks were arranged in clusters in the central area of the classroom, with the activity centres around the periphery. The computers were in a corner of the classroom.	The students' desks were arranged in rows in the central area of the classroom, with the activity centres around the periphery. The computer activity was located on the centre of one of the longer walls.
Differentiation	
No apparent differentiation between grades and gender. Occasionally, children at the computers were encouraged to combine in teams that would help the less skilled computer users. At the end of activity centre time the teacher would tell the children it was time to get ready for recess and time to put the activities away.	The activity centre time was segregated by grade. The teacher would have one grade in the corner listening to a story and the other grade would be at the activity centres. Then about half-way through the class, they would switch. There was some organization and motivation by gender, where the children would line-up by gender and be compared to each other in terms of noise or cleaning up. The teacher would say "I like the way the girls are cleaning up".

Classroom with Low Structure	Classroom with High Structure
Activity Levels	
This class was always very busy, very noisy and very active. The children at the computers were among the noisiest. They also tended to stay at the computers for the whole class, whereas children at other activities tended to move around a few times, to different activities. There was only one occasion when the computers had nobody at them, this was when it was discovered that the gerbils had babies. The whole class was "wild" with excitement. The computer remained vacant for only a few minutes though. However, talk about gerbil babies dominated the rest of the computer activity. Although the interactions between students were primarily verbal, there was no lack of touching and physically playful interactions. The children in this class engaged in interactive play almost exclusively during activity centre time. In this class, students cheered for themselves and others quite often. Self-referent exclamations of success or a score were frequent and loud in this class as well.	This class was very quiet and very still. On every observational recording there is at least one time when the computers were not being used at all. Similarly, there were many occasions when there were two children working side by side and virtually no verbal interaction, and still other times when only one child was at the computers. The exchanges between students was often non-verbal, like shaking the head, nodding, pointing or shrugging. When a child did something particularly exciting on the computer, she/he would clap silently and smile or raise an arm in triumph with no sound. The children in this class engaged in parallel play almost exclusively during activity centres.

The above discussion on classroom organization suggests differences in the kind and frequencies of interactions between students at both locations. In the following section, behavioral specimens from each location will be used to show some of these structural and organizational processes as they are reflected in the children's behavior. Unfortunately, almost all the behavioral specimens come from Location # 1. Due to the low-level of interaction permitted at Location # 2, the students seldom talked above a whisper. The microphones used in the observation of interactions were not sensitive enough to pick up the whispering so that they could be transcribed. The data is presented in a two column format with descriptions of the non-verbal behavior and other situational observations placed in square brackets and interpretive statements placed in round brackets. The interpretive statements represent only those comments which are necessary for an understanding of the transcribed data. They do not represent analysis but familiarity with the situation being observed, so that the reader may have a clearer picture of the interaction.

Behavioral Sequences

Sequence # 1

The following interactional sequence is a record of the social setting in the classroom Activity Centres at Location # 1. This particular segment, approximately 15 minutes long, like many others in this location had to be re-coded numerous times. This task was finally accomplished by isolating the behaviors at each computer and coding them separately. In this segment, the low structure in the classroom environment and around the computer activity shows itself in a rich, very noisy and lively interactional sequence in which there are power struggles, the creation of new rules, negotiation, conflict, aggression, and cooperative play with Julie and Amanda at Computer I and a relatively smooth and cooperative sequence of interactions between Allison and Lenny at Computer II.

Amanda and Julie at Computer II:

[Julie takes Amanda's turn]

A: Julie! It's my turn. I get to do my turn. I get to do it then.

J: It's not six!

A: I get to do it one more time.

J: No!

A: I didn't even...

(Amanda is mumbling, impossible to decipher, appears to be upset)

[Julie takes her turn, then Amanda takes hers]

J: Kay, if you're not ready, I'm doing it. If you're not ready I'm going to be doing it. ... I wish they'd go to a hundred, I wish they did....

["Kay" is short for "O.K."](can't decipher in full what Julie is saying, it appears that she is frustrated with the limitations of the program)

[Julie presses a key when it is Amanda's turn. Amanda grabs her arm, and bats her hand away]

A: It's my turn!

(very loud)
[then engages in a relatively long glare at Julie]

[Julie responds with a shrug of the shoulder]

J: You weren't ready.

(assertively)

A: Yes, I was.

J: You didn't press it right away.

[Amanda leans toward Julie] (Has a facial expression of self-righteous anger, can't decipher what Amanda was saying, but the emphasis was on "you", what "you" Julie did)

A: Ya, maybe YOU just...

[Julie ignores her]

A: I get to do it one more time!

[Amanda pauses and looks at Julie for a response. Julie ignores her and

A: I'm telling.

continues to work on computer]	**A:**	**You just took my turn.**
[Amanda stands up] (raising her threat to call the teacher to a more serious level)	**J:**	**Ok, whoever's not ready the other person gets to do it, that's the way its gonna be**
[Amanda falls back down into her chair, arms folded across her chest] (facial expression: complying begrudgingly? defeat? failure?)		

The next few minutes Julie and Amanda are playing at the computer in absolute silence. They are concentrating on turn-taking, ensuring that they are quick and careful not to miss a turn. Amanda stands up, with one hand on hip, moves in closer to the keyboard, almost hovering over it. She appears to be playing quite seriously and watching the keys and screen very closely. At this time, there is a clear difference in the manner in which keys are hit. Keys are being pounded and the girls lift their arms up over their heads after each key press, as if their arms going up was an equal and opposite reaction to the force at which the keys were being pressed .

Still standing, Amanda hits one key and seems quite pleased. She bounces and claps and smiles. Then she sits down. The two begin giggling and laughing with increasing loudness which ends up as shrieking and squealing and playing very excitedly. Amanda jumps up every once in a

while to bounce and giggle, then sits down. On one occasion, she stands up in response to the thunder, looks out the window wide eyed, and puts her fingers in her mouth. She did not respond to the thunder this way, during the silent period. They are both pouncing on the keyboard in a slightly different way now. Firmly, and quickly, but no arm raising, just a hand-wrestling match to see who can hit the keys first.

[The keyboard locks-up]

A & J: Oh, Oh.

[both stop and stare]

[Amanda sits down, eyes wide, fingers go in her mouth; Julie tries the keyboard again.]

[pointing to the screen] **J: Now you did it... that went out.**

[Julie grabs Lenny's shoulder] **J: Lenny, look what Amanda did.**

[Lenny does not respond and continues to chat with Allison at Computer I] **J: Lenny!**

J: Lenny! Look!

[Julie grabs his arm and begins shaking him harder and harder, until his whole body is shaking. All the while, he continues to chat with Allison. Julie leans right over to face Lenny **J: Lenny!**

and calls his name quite loudly]

[Lenny looks over at their screen]

L: What?

[Julie pointing to the screen]

J: Look what Amanda did. She did all this.

[Amanda with fingers in her mouth, standing and pointing to the screen. She giggles after she claims that Julie did it]

A: No! Julie did that, that went out when Julie did that. That went out when Julie did that.

[Julie takes Amanda's arm and makes Amanda start punching herself]

J: Why do you punch yourself Amanda?

[Julie and Amanda start pointing fingers at each other and wrestling arms and hands,(playfully), laughing]

J-A: Load it again. Turn it off.

[Allison from computer I, grabs Lenny's other arm sharply, now Lenny is being tugged in two directions. He turns back to his own computer, but leaves his right hand at the base of computer II] (as if ready to help)

Al-L: Squirrel! Press return.

[Amanda gets up and turns computer off at the same time that Lenny turns back toward their computer]

L: Ok, All...

[the screen goes blank]

L: Amanda! All you'd have do is press run, when it says ready and there we

[while Lenny is talking, Julie grabs his arm and holds it up. Lenny continues talking with one arm suspended by Julie]

are...and then there you go, you'd get back to the game. And you just turned it off.

J: You shouldn't have listened to me.

[Julie grabs another tape and stands on her chair to load. Amanda is still standing near the back of the computer]

J: How many rabbits?

[while looking at tapes]

A: You press rewind. You press rewind.

J: How many rabbits, we're not playing how many rabbits.

[Julie grabs another tape; Amanda stands on her chair too.]

A: I don't want to play haunted house.

[Julie is loading "Haunted House"]

J: We'll try it again. We'll try it again. We're just gonna try it.

[Amanda moans and watches as "Haunted House" is loading]

A: We're just gonna try it.

[Julie and Amanda are waiting for "Haunted House" to load; Julie discovers the microphone on the computer and makes sounds into it. Then she shakes Lenny] (to get is attention)

[Julie starts saying words into the into the microphone and Amanda joins her; Julie grabs Lenny] (to show him that they were saying things into the microphone)

J-L: I said "no" on it.

[Amanda runs around behind Lenny and puts

both arms on him and makes some indecipherable noises.]

J and A(mic):
Nooooooooo, mama, dada, brother, sister, soccer, snake,

(Allison at computer I appears to be getting annoyed at all the disturbances with her partner)

Al-A: Leave him alone! He has something to do!

[Lenny turns back to playing at his computer and Amanda & Julie continue to play with the microphone while waiting for haunted house to load]

Allison and Lenny at Computer I (during the same time period)

L: Our baseball game is gonna get rained out.

[Julie from computer II responds]

J: Ya, so is my brothers

[Allison offering help to Lenny] (the "S" refers to assistance with spelling or finding letters on the keyboard)

AL: S

L: I'm looking for S.

[Allison helping Lenny]

AL: Press S.... A.

("I get caught" refers to a clue about a particular animal. They are playing

L: Yeh! I get caught!

a game called "Animals of Ontario")

AL: **Yes, I am a gardener snake.**

L: **Yes, we want to play again.**

[Allison is pressing keys and Lenny is watching and helping; can't hear what Lenny's clue to Allison was because the girls at Computer II are making too much noise]

L: **You press number six, it's easy. Its.....**

AL: **It is?**

L: **Ya.**

AL: **I don't know what you are talking about.**

L: **It has a hard shell.**

AL: **A turtle?**

L: **Ya**

AL: **Oh, I couldn't get it, I thought it means underground.**

[Thunder - as was mentioned previously, it has been raining and thundering throughout this activity centre time]

L: **No. That'd be an ostrich, but an ostrich ain't on there.**
Holy shoot, we ain't having no recess, I know that.

[Allison working on her turn still, the`right' means that she guessed the correct answer.]

AL: **Right!**

[Allison and Lenny taking turns]

L: **But I gave you it. I gave you the answer.**

[Lenny reading the clues from the screen out loud, presses key, wrong answer]

AL: **I am a reptile...Ohh**

L: **Ohh, magic. Two ta one, I beat Steve by a mile, seven ta five.**

[Allison and Lenny are talking, but the noise from computer II is drowning it out]

L: I never get this one.

[Thunder again; Lenny stands up and looks toward window;]

AL: It's a squirrel.

AL: I'm not scared, it's only thunder

[Allison is sharing a story with Lenny, about someone scared of thunder storms, can't tell what it is, too much noise from computer II. This is the point where Julie grabs Lenny to get his attention]

AL-L:....

AL: Squirrel! Press return.

L: Ok, All...

[At this time, Lenny is responding to Julie's request for attention to their blank screen. But Amanda has already turned the computer off.]

L: Amanda! All you'd have do is press run, when it says ready and there we are...and then there you go, you'd get back to the game. And you just turned it off.

AL: Sorry Lenny, I'm a mammal.

AL: This is hard...I live with others and eat....

L: I know what it is.

[Allison whacks Lenny's arm two times] (to get his attention)

AL: I got an ant, its an ant! It's many and it's the same!

[the computer flashes a big bold "RIGHT"]

[Lenny presses some keys and sees the score, in favour of Allison]

L: Holy shit! Three ta one.

L: My turn, I gotta get number six.

(When Allison is chanting "I lay my eggs in the sea" she is reading the clue from the screen. It doesn't appear that she knows the answer.)

AL: I lay my eggs in the sea.

L: I can't get this one, whoever got it right, I don't know.

AL: I lay my eggs in the sea.

[Amanda from Computer II, puts arms around Lenny's shoulders and makes indecipherable sounds]

AL-Am: Leave him alone! He has to do something. ... I lay my eggs in the sea.

L: I don't know what it is.

L and A: Right!

AL: You got it right!

L: I didn't even know, I didn't even know, I just did it. I was right!

AL: I make a barking sound...dog

[Lenny points to the screen]

L: There ain't no dog up there.

[Thunder, and lots of background noise from computer II, who are giggling and chanting words into the microphone]

AL: I make a barking sound.

L: Fox.

L: That's the only one that would make a barking sound.

[Very loud thunder]

[Lenny stands up]

L: It's raining now, I know it's raining. Oh, don't be scared.

AL: I make a barking sound.

Sequence # 2

The following interactional specimen is a representation of the social setting at Location # 2 during Activity Centre time. The classroom is very quiet. So quiet that I can hear kids sniffling, shoes shuffling, chairs squeaking and the movement of cursors on the computer screens. The teacher is reading a story to a group of children in the far corner of the class. The children at the computers primarily use nonverbal communication, supplemented with imperceptible whispers. One little boy says "Wooooooooooo" and pierces the silence. The teacher responds immediately by calling him over to her: "Wayne come here. Read some books and go sit down." A few minutes later, the Teacher says: "Grade Twos go back to your seats. Now let's see if you can go back without one word. Nothing." Apart from being able to recite the whole story that the teacher read to the Grade Ones in the corner, virtually nothing else could be transcribed from this particular activity centre.

Sequence # 3

The following is an interactional specimen from the Computer Lab at Location # 2. During this activity, the noise level was much higher than in the Classroom Activity centre time. Like other subjects in this study, the children in this specimen are give pseudonyms, however, as was mentioned in the previous section on classroom organization, the researcher did not get to know any children by name at Location # 2. Therefore, the names are not really given to protect the identities of students, but rather tc enhance the clarity of the transcription.

[Andrea looks over at Justin's screen. He is sitting alone at a computer. She is sitting with another female. The children are working on the Story Writer program.]	**A-J:**	**You're only on line three?**
	J-A:	**Ya, so, I just started.**
	A-J:	**Do you want me to help you with that?**
	J-A:	**No!**
[Andrea goes over to the right hand side of Justin and looks at his screen]		
(Suspecting that some unwanted help is on its way) [Justin issues a warning]	**J-A:**	**Don't help me or I'll kill ya!**
[Andrea ignores Justin's threat and offers help.]	**A-J:**	**Erase that, it's supposed to be a capital. Press Shft-I.**
	J-A:	**I know that, ya dunk.**

Sequence # 4

The following interactional specimen begins with Jacqueline and Pam in the classroom activity centre at Location # 1 arguing about what game they want to play. It exemplifies the projective use of computers for role playing and the use of computers as a medium for the expression of feelings.

	P:	**Ok, Ok, um do ya wanna play secretary and we'll both be secretaries?**
	J:	**I wanta be secretary first. First Secretary.**
(Pam as the "boss")	**P:**	**Um, will you type this letter? Um, please.**
[Jacqueline starts typing]		
	J:	**Now, um, what was that letter that you wanted me to write in Chinese?**
(Jacqueline as the "secretary")		
[Pam tells Jacqueline what to type]	**P:**	**Plus.**
	J:	**No, say we're doing it in Chinese.**
	P:	**I know, but I just put "have" 'cause I know how to spell it.**
[the girls call the teacher "T"]	**J-T:**	**Could you come and see how, um, we wrote um, love Pam and Jacqueline in Chinese?**
[both girls are giggling]		
[The teacher responds and comes over to see their creative work]		

(It's Pam's turn to be secretary now) [she begins to type]

[Jacqueline reading Pam's screen]

J: I hate Vicki and you.

[Jacqueline looks at Pam] (she appears puzzled)

P: I really like you.

(Jacqueline appears to be testing the truth of the feelings Pam expressed on the Computer.)

J: Do you like Vicki?

P: Yes,...No I don't.

[Jacqueline begins to type and reads her work out loud]

J: I hate Pam.

(Pam changes the subject completely, and addresses Jacqueline in an affectionate or more personal "Jaq")

P: Um, Jaq, I wanna play a game.

J: This is more funner.

[The two girls begin hitting the keys with both hands and eventually get reprimanded by the Teacher for banging so hard on the keys]

Sequence # 5

The following interactional scene shows some cross-sex and same-sex interactions with two girls Jacqueline and Amanda playing on Computer I, and Peter and Steven playing on Computer II. It provides a useful illustration of gender differences on the computer when a female and male dyad are both playing the same competitive game "Shoot the Letter". Furthermore, the richness and uniqueness of a children's culture is evident by the nature of utterances and the flow of the interaction. That there is role playing, alliance forming, power struggles, affectionate and aggressive behavior, different styles of identification with the game and different kinds of competition going on, provides a window into the construction of social worlds and social selves by children.

(Peter is rooting for Amanda in her competition with Jacqueline. He is acting like a coach to her)

P-A: Get a better score than her, Amanda. Not now, I'll tell ya when to shoot.

(Jacqueline appears to not like this alliance forming)

J-P: No, Peter, play your own game.

[Peter ignores her and continues to coach Amanda]

P-A: Shoot! Now!

[Jacqueline threatens to tell the teacher]

J-P: I'll tell, Peter.

(Peter & Steven ignore the threat)

P: **15 shots and she's only got 18.**

S: **15 shots and she's only got 18.**

P-J: **Amanda can beat ya.**

[Jacqueline is sitting back with her arms folded across her chest] (watching Amanda struggle to find certain keys).

(When Amanda misses her shots, Jacqueline ridicules her by laughing) [Amanda makes a (hostile) face at Jacqueline] (and then waits eagerly for Jacqueline to go)

J-A: **I'm not telling ya. I'm not telling ya..... Ha.**

J: **Ha, Ha.**

[Jacqueline misses and Amanda laughs]

A-J: **Ha, Ha, you did it to me so I can do it to you.**

[Amanda is hitting the keys very hard] (she appears to be getting frustrated)

A: **This key don't even work ...I'm pressin these...I might as well press the wrong key.**

J-A: **Want me do it for ya?**

A: **Yes**

(the interaction between Amanda & Jacqueline changes again because Jacqueline is dominating the board)

P-A: **Amanda, don't let her do that!**

[As she says this, Amanda puts her hand on Peter's shoulder and pats him on the back. Then she begins shaking him - and he does not resist but goes like a rag-doll. She stops for a moment, pulls him back, looks at his face, then continues shaking him harder and harder until he bangs his head on the keyboard]

A-J: At least he's farther than you!

P-J: 77, beat that Jacqueline.

A: Good thing Peter's winning.

[While holding his head]

P: Owww!

[Amanda laughs as she continues to shake Peter until he bangs his head three more times on the keyboard- meanwhile all this time, Peter's partner Steven has tried to continue playing his game on the same keyboard] (he appears to be getting annoyed)

(Steven yells at Amanda)

S-A: Amanda! Amanda!

[Peter presses the key for Steven]

P: I'll get it for him.

(Steven is trying to play despite the disturbance)

S-P: Tell Amanda what she is doing!

[Peter tries to break away from Amanda and hits his own head on the keyboard]

P: I hate it when that happens.

[While asking Jacqueline these questions, Peter is holding Amanda's face in his hands and playing with her mouth or nose.]

P-J: Jacqueline, who picked you? Did you pick Amanda or Amanda pick you ?

J: **She picked me.**

P: **Well, let her...well SHE should be playing right now!**

S-P: **Pete, 40! Hey Amanda, I got 40! in only 10 shots, 10 shots!**

(Peter gets back into the game with Steven) [with one hand on Amanda's forehead, he gives her head a little shake, leaves his hand on her and then turns to his keyboard with the other hand, to play his turn]

[Peter talking to the computer](very loud)

P: **Kill that Sucker! I'll kill you!**

J-A: **Amanda, it's your turn.**

[Peter talking to the characters on screen] (loud)

P: **Dead! I want you dead!**

P-A: **Who would you marry if you had the chance, me, Steven, or Lenny?**

[Peter and Amanda are playing with lots of physical contact]

A: **I don't know.**

P: **Who?**

A: **I don't know.**

P: **Me, Steven or Lenny?**

J: **She'd marry Steven, I know.**

P: **Steven?**

A: **I don't know.**

P: **Just tell me who you would if you could.**

A: **I don't know.**

P: **Just tell me "yes" or "no". Ya have ta say yes or no.**

[At this point, Peter takes Amanda's face in his hands(to get her to look at him face to face.) He then grabs her hands]

A: **Jacqueline saying it.**

P: **Just tell me.**

A: **Don't you understand?**

P: **Steven?**

A: **No.**

P: **Lenny?**

A: **No.**

(After eliminating Steven and Lenny, Peter realizes that it is he.) [He has a big smile, then covers his face with his hands. Amanda giggles. Peter puts his head down on the back of the chair with his hands over his face, giggling]

[Peter goes back to his computer to take his turn]

S: **Hey, Pete. Hey, Pete, 60!**

	A:	**Daddy**
[Amanda leans her head on Peter]	**P-A:**	**Get out of the way you doggy.**
	A:	**Daddy**
[Peter puts his hands on Amanda's forehead. She is continually grabbing him and pressing up against him]	**P-A:**	**You have teeth like a doggy.**
[Amanda takes Peter's arm and tries to put it around herself]	**A:**	**Daddy**
	P:	**Let me play.**
	P:	**If you don't leave me alone, I'll tell.**
	A:	**Daddy**
	P:	**I'm not daddy - I'm a doggy. Woof, Woof.**
	P:	**I'm not a doggy. I'm not a Woof Woof.**
	P:	**Leave me alone, Amanda. Stop bothering me. I'm gonna get a hundred. I'm gonna tell the teacher.**
(Meanwhile, Jacqueline is trying to "kill" Amanda on screen by having the letters represent her)	**J:**	**I'm trying to kill Amanda here. Ohh yaa.**
[The teacher comes over and asks Amanda why she is not playing her turn]		

A-T: **Jacqueline won't let me have a turn.**

J: **No, that's not true. she's too busy playing with Peter.**

J: **I don't want to play this game anymore. I'm too bored.**

A: **Concentration?**

[Jacqueline gets up and walks away] (to go talk to the Teacher)[Amanda gets up and walks away]

[Amanda comes back,and takes the seat -directly in front of the screen and keyboard- where Jacqueline was sitting previously. Then Jacqueline comes back and wants her spot back]

J: **I get that chair.**

[Jacqueline sits down on the chair where Amanda is at and squeezes her off. Amanda looks at her] (outraged)

A: **You were gone.**

P: **Jacqueline! you pushed Amanda out that seat right?**

J: **I was sitting here.**

A: **Ya, and she wasn't there when I got there.**

P: **Tell on her.**

[Jacqueline blocks the cassette recorder/loader with both hands]

J: No, because I just got up to go and ask [the teacher] something.

A: Ya, and I went too. We're not playing this game.

[Amanda goes to the back of the computer and switches it off]

J: We are too.

A: We are not.

[Jacqueline puts her hand up]

J: I'm telling [the teacher] she said to finish with this game.

A: Ohh, I want a different game.

J: I'm telling. [the teacher] said to finish with this game.

P-J: You turned it off.

[Jacqueline hits Peter when she says this]

J: She did!

[Jacqueline's hand is still up]

A: I did. Ok I'll turn it...

J: No!

A: Well, maybe I just don't know Jacqueline. Ok Jacqueline, they're gonna catch you on tape. They're gonna see you on tape with your hand up. You want them to see you

(one of the very few instances when the presence of the researchers had a noticeable influence on the interaction)

on tape. Ok, fine, I don't care, they're gonna look right at YOU.

[Jacqueline looks directly at the camera and puts her hand down]

A: I'll load it again. It's all my fault.

[Jacqueline leans over and switches the computer off and puts her hand back up again.]

[Amanda jumps up and switches it back on again, Jacqueline's hand is still up. Amanda begins to load another tape. The teacher says it is time to put the activities away now. Jacqueline jumps up and runs from the computer.]

J: You put it away.

A: Ya, I will, and I won't be your friend.

[Amanda runs after her and brings Jacqueline back]

J: You won't let me do anything.

[Jacqueline walks away again]

A: Thank you.

The above two sections on Classroom Organization and Behavorial Sequences are presented before the quantitative data to reveal both the complexity and subtlety of the processes involved in the structure of the learning environment and the nature of the children's interactions.

By examining the Classroom Organization on a number of similar dimensions, the quantitative data specifically relating to the two Locations are enhanced with meaning and clarity. For example, in the tables "Location" emerges as an important variable in the discussion on aggression. From an understanding of the various rules and pedagogic practices at both Locations, we can see that the variable "Location" really means pedagogic structure.

Because this research is interested in documenting gender differences as they are directly observable, the classroom organization has become a crucial variable in this process. Much of the past research on gender differences in the classroom gave no description of the social organization of the classroom. The unexpected finding of two completely different classroom structures in this study has resulted in the recognition of the essential role this variable can play in understanding gender differences in young children.

Equally critical for this study are the actual interactions of children. Here, the behavioral sequences highlight the complexity of these interactions. At the same time, they illustrate the fallacy of reducing these to simple dichotomous representations such as "aggressive" and "cooperative" or "masculine" and "feminine". Indeed, the actual transcription of children's interactions reveals that simplistic reductions are quite inaccurate, and that

children are highly capable of self-reflexive behavior and competent social interactions.

Quantitative data that are grounded in qualitative descriptions such as the above two sections yield a more complete data base for an understanding of symbolic interaction. For this reason, the qualitative data were presented first, so that the reader may have some idea of the structural influences on the interaction recorded, the complexity of the interaction observed, and hence the abstraction involved in its presentation.

Quantitative Representations of Aggressive and Cooperative Interactions

The following section shall first examine the frequency distribution tables for all categories of cooperative and aggressive interactions. Following these, the statistical tables will be presented in separate sections on aggressive interactions, cooperative interactions and cross sex and same-sex interactions.

The first four tables presented in this section are frequency distribution tables for all categories of cooperative and aggressive interactions that were coded and all those categories that were subsequently used in statistical analysis. The distribution of gender in the population being examined is 17 girls and 21 boys. Broken down by Location, the distribution is as follows: Location #

1 had 11 boys and 7 girls and Location # 2 had 10 girls and 10 boys.

Tables 1 and 2 show a clear distribution of scores which fall almost exclusively into the first four columns of the independent variable gender interaction categories. Because the categories involving self-referent behavior (Female/Male to Self) and interactions directed at the whole group (Female/Male to Group) represent less than one half of a percent of all interactions coded, they were not included in the statistical tables that follow. Furthermore, the cell frequencies for most of these categories falls into the range of only one to three, with the exceptions of four cell totals which are : 4, 6, 32, and 28. Such low cell frequencies impede the use of chi-square tests of significance. The two cell totals of 32 and 28 represent the gender interaction categories of female and male to self, in the categories of cooperative behavior that involve loading and/or checking the computer.

In Table 3, which shows "All Categories of Cooperative Interaction Used in Statistical Analysis", same-sex interactions are higher than cross-sex interactions, and the modal category is "female to female" interactions. The difference between the same-sex interaction, totalling 371 for females and 283 for males, is much greater than the differences between the cross-sex interaction totals of 167 for "female to male" and 174 for "male to female". In other

words, these data suggest that both sexes interact with the same-sex more often than with the other sex. Within this pattern, females show higher same-sex interaction scores than males, and both sexes show equal amounts of cross-sex interaction in the cooperative behavior observed.

In all four categories of cross-sex and same-sex cooperative interactions, the modal category is "Offer Verbal Help". Within this category of cooperative interaction, the highest score is same-sex interaction for females, with a score of 101. The next highest score is 68 for "male to male". It is this category which accounts for the greatest difference between females and males in same-sex interaction as was mentioned above. Although female same-sex interaction scores are all higher than male same-sex interaction scores, the differences are usually in the range of 10 or less.

In the patterns of cross sex interaction shown on this table, three categories of cooperative behavior indicate some moderate differences. One of these is "Ask Questions", where females asked 29 questions of males, and males asked 22 questions of females. The second category which shows a difference is that of "Loading/Checking the Computer". In this case, the instances of a male and a female sitting at the computer reveal 24 occurrences of the male doing the loading and checking, and 14 occurrences of the female doing the loading or checking. The third category in which there

are some difference in behaviors observed is that of offering help to a partner at the same computer by "pressing or pointing to" his or her key. In this case, females offered this type of help to males only 2 times, while males offered it to females 11 times.

In terms of responding to questions by members of the other sex, there is no noticeable difference between giving an inappropriate response and giving no response. For giving inappropriate responses, both categories of cross sex interaction had a score of only three, and for giving no response, there was a frequency of five for females giving no response to males, and four for males giving no response to females. The total number of questions asked by students was 142. Of the 142 responses coded, 102 were appropriate, 22 were inappropriate and 18 gave no response.

Table 1 All Categories of Cooperative Interaction

Categories of Cooperative Interaction	Gender Interaction Categories								
	F-F	M-M	F-M	M-F	F-S	M-S	F-G	M-G	Totals
Ask Questions	51	40	29	22	1	1	2	2	148
Respond to Questions:									
Appropriate	32	34	19	17	1	1			104
Not-Appropriate	10	6	3	3					22
No-Response	5	4	5	4					18
Offer Verbal Help	101	68	43	40	2		3	1	258
Offer Physical Help:									
Point own screen	50	40	14	13	6	1	4	1	129
Point oth.screen	19	19	12	13				1	64
Press/Pt.own key	11	8	2	11					32
Press/Pt.oth.key	41	30	26	27				2	126
Load/Check Comp.	51	34	14	24	32	28			185
Totals	371	283	167	174	42	31	9	7	1086

Gender Interaction Category Codes:
F-F = Female to Female interaction
M-M = Male to Male
F-M & M-F = Cross-sex Interaction
F-S & M-S = Female or Male to Self or Alone at Computer
F-G & M-G = Female or Male to Group

Table 2 All Categories of Aggressive Interaction

Categories of Aggressive Interaction	Gender Interaction Categories								
	F-F	M-M	F-M	M-F	F-S	M-S	F-G	M-G	Totals
Verbal Aggression:									
Ignore	8	6	9	2					25
Comply	25	15	4	3					47
Self-Assert	73	35	23	25			2		158
Command	54	27	16	15					112
Threat	16	9	5	5					35
Attack	3	8		8					19
Direct Physical Aggression:									
Escape/Withdraw	4		2	2	1				9
Ignore	3	4	1	3					11
Comply	16	15	2	5					38
Self-Assert/Com.	74	48	38	17			1		178
Threat	3	3	5	6	1				18
Attack	15		15	1					31
Aggression through Equipment:									
Ignore	1	1							2
Comply	26	9	1	4					40
Self-Assert/Com.	17	8	4	5		3			37
Threat	9				1				10
Attack	1	1		1	1	2			6
Totals	348	189	125	102	4	5	3	0	776

Table 3 All Categories of Cooperative Interaction used in Statistical Analysis

Categories of Cooperative Interaction	Gender Interaction Categories				
	F-F	M-M	F-M	M-F	Totals
Ask Questions	51	40	29	22	142
Respond to Q's :					
Appropriate	32	34	19	17	102
Not-Appropriate	10	6	3	3	22
No-Response	5	4	5	4	18
Offer Verbal Help	101	68	43	40	252
Offer Physical Help:					
Point own screen	50	40	14	13	117
Point oth.screen	19	19	12	13	63
Press/Pt.own Key	11	8	2	11	32
Press/Pt.oth.Key	41	30	26	27	124
Load/Check Comp.	51	34	14	24	123
Totals	371	283	167	174	995

In Table 4, which presents "All Categories of Aggressive Interaction used in Statistical Analysis", the same-sex interaction categories show significantly higher frequencies than the cross-sex interaction categories. Again, the "female to female" category is the modal gender interaction category. The female to female interactions, with a frequency of 348, account for almost half of the 764 total aggressive interactions recorded and are almost two times the frequency of the male same-sex interactions with a frequency of 189. In the cross sex interaction categories, the "female to male" aggressive interactions are 125 and the "male to female" aggressive interactions are 102.

The modal category for the dependent variable aggressive interactions is direct physical aggression in the form of self-assertive and/or commanding behavior. The modal score of 74 falls in the "female to female" gender interaction category. The "male to male" score on this variable is significantly lower at 48. The category of aggressive verbal interactions in the form of self-assertive behavior has a frequency of 73. With a difference of only one from the modal value of 74, we may therefore consider this a second modal score, which also falls in the "female to female" gender interaction category. The "male to male" frequency for self-assertive aggressive verbal interactions is 35, less than half of the female score on this variable.

The frequencies for cross sex interactions for self-assertive aggressive interactions show no noticeable differences between the sexes. However, in the cross sex interactions for direct physical aggression in the form of self-assertive or commanding behavior, the "female to male" frequency of 38 is a little more than twice the frequency of the "male to female" frequency of 17. Similarly, there is only one instance of a male physically attacking another person, who in this case was a female and 15 instances of females attacking other females, as well as 15 instances of females attacking other males.

Another example of variance between frequencies is evident in the category on "aggression through the equipment". In the same-sex interaction category, females were observed to comply with other females 26 times and males were observed to comply with other males 9 times. The frequencies for cross-sex interaction and compliance indicate that females complied with a males once, and males with females four times.

Also in the category of "aggression through the equipment", females were observed to use threats on nine occasions while males were not observed using threats. However, this may be somewhat misleading because of coding procedures. First of all, there were two occasions when a male was interacting with the computer and the threat directed at the computer was issued while the male was

actually attacking the computer. Hence, this instance was coded as an attack and not a threat.

Table 4 All Categories of Aggressive Interaction used in Statistical Analysis

Categories of Aggressive Interaction	Gender Interaction Categories				
	F-F	M-M	F-M	M-F	Totals
Aggressive Verbal:					
Ignore	8	6	9	2	25
Comply	25	15	4	3	47
Self-Assert	73	35	23	25	156
Command	54	27	16	15	112
Threat	16	9	5	5	35
Attack	3	8		8	19
Direct Physical:					
Escape/Withdraw	4		2	2	8
Ignore	3	4	1	3	11
Comply	16	15	2	5	38
Self-Assert/Com.	74	48	38	17	177
Threat	3	3	5	6	17
Attack	15		15	1	31
Aggression through Equipment:					
Ignore	1	1			2
Comply	26	9	1	4	40
Self-Assert/Comm.	17	8	4	5	37
Threat	9				9
Attack	1	1		1	3
Totals	348	189	125	102	764
Totals T's 3&4	(719)	(472)	(292)	(276)	(1759)

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Statistical Tables Examining the Variable Aggression

The creation and presentation of tables involves a number of substantive and technical conventions and/or decisions. The substantive conventions used in the creation and manipulation of data for this research primarily involved the creation of the categories "high" and "low" aggression.

To facilitate the use of the Chi-Square Test of Independence, categories from the frequency tables were generally collapsed into two dichotomous categories of high and low aggression or physical and verbal aggression. Although the distinction between physical and verbal aggression is quite clear, the distinction between high and low aggression is more readily subject to judgement. Especially problematic are the concepts of "Ignore", "Comply" and "Escape and/or Withdraw".

For example, for the dependent variable Verbal Aggression, the following distinctions are made between high and low aggression:

Low = Comply, Ignore and Self-Assert

High = Command, Threat and Attack.

That "comply" and "ignore" constitute aggressive interactions is justified for two reasons. First, both complying and ignoring behavior are necessary in interactions involving aggression. Using a Symbolic

Interactionist perspective, the research focuses not on isolated behaviors, but on a spectrum of interrelated joint acts. Previous research has tended to isolate interaction processes into the consequences of interaction. This is avoided by attempting to include a broad range of interrelated acts into the measurement process. Second, "ignoring" and "complying" behavior may be seen as forms of control, manipulation or passive aggression, and thus fall into the definition of aggression used in this research.

Another distinction may be clarified by examining the broad range of acts included in the variable. The dichotomous distinctions of high and low aggression used in these tables place "Self-Assertive" behavior in the "low" category for verbal aggression and in the "high" category for both forms of physical aggression. Traditionally, self-assertive behavior has not been considered "aggressive". However, since this research utilizes a definition of aggression which includes attempting to control the behavior of others, self-assertive behavior is considered aggressive. But on the range of verbally aggressive behaviors, asserting one's rights, or declaring one's intentions, is not nearly as aggressive as commanding, threatening or attacking another person. It is noted that in some cases, self-assertive behavior might easily be disguised commands or threats, especially when they are said loudly and forcefully.

The range of behaviors included in the two categories of physical aggression have put all physically aggressive behaviors in the high category and all other related behaviors in the low category. Furthermore, because "Self-Assertive" and "Commanding" physically aggressive behavior have been collapsed into one category, there is further justification for including "Self-Assertive" in the "high" aggression category.

The dependent variable "Aggressive Physical Interaction" uses the following distinction:

Low = Escape/Withdraw, Comply and Ignore

High = Self-Assert/Command, Threat, Attack.

The use of the "Escape/Withdraw" variable was found necessary when coding aggressive physical interactions, because children occasionally responded to aggression by physically withdrawing from the interaction. This was evident for example, by their sitting back or turning away from the computer in response to an overly domineering partner as already discussed in the previous chapter. Although the children could have been "escaping and/or withdrawing" from verbal interactions, which could be evident by patterns of silence in relation to verbal and/or physical aggression, the coding of "silent periods" is too problematic for reliability and validity and thus was not included in the category on verbal aggression.

The behavior of "Escape/Withdraw" was also not included with the dependent variable "Aggression through the Equipment" because this category involved both physical aggression towards the computer as well as physical aggression toward other children. As discussed in the Description of Coding Categories (see Appendix B), physical aggression that involved hitting, threatening, or self-asserting/commanding behavior towards another person with some part of the computer equipment was included in this category. Therefore, an indication of "Escape/Withdraw" could be from the computer, or from an individual, and since this does not present a clear representation of the interaction, this concept was not utilized for the variable Aggression through the Equipment.

The above discussion illustrates the active decision-making role the researcher must take in all stages of the research act. Each decision concerning the measurement of variables is subject to scrutiny and verification.

The technical conventions used for the presentation of data do not generally require such scrutiny and verification. Ideally, the tables presented should be self-explanatory, and the tables that follow are constructed in such a way. The symbol notation at the bottom of the tables indicate the chi-square value found. This value includes a number subscripted below, to represent the degrees of freedom for that particular table. For example, the

following notation: X_1^2 means the chi-square value with one degree of freedom. After that, a lower case "n.s.", which stands for not significant, may be found, or the confidence level at which the result was significant will be indicated. If a given result is significant at a .05 level and at a higher level, such as .01, then the highest confidence level at which the result was significant will be presented. In all cases when a result is presented as not significant or "n.s." it is to be understood by the reader that this means the said result was not significant at the .05 level. In tables that have at least one cell with a frequency lower than five, Yates' Correction for chi-square tables is also given and symbolized as follows: X^2_c.

Turning now to the data, Tables 5, 6, and 7 examine the three major categories of the dependent variable aggression with the independent variable gender. The assumption of independence between gender and aggression was accepted for physical aggression through the equipment and aggressive verbal interactions.

Table 7, which presented the variables gender and aggressive physical interaction, shows that the null hypothesis of no association between the two is rejected at the confidence level of .025. The differences between the expected cell frequencies and the observed cell frequencies showed that females scored lower on "low aggression" and higher on "high aggression" than expected, with the exact

reverse for males. Therefore, the significant result in Table 7 would lead to accepting an alternate hypothesis which states that females will show higher aggressive physical interaction than males.

By examining gender and all three categories of aggression by Location, Table 8 clarifies the result reported in Table 7. In this table, the null hypothesis that "the relationship between gender and aggressive interaction are independent of location" was rejected at the .001 confidence level. The differences between the expected cell frequencies and the observed cell frequencies resulted in the males at Location # 1 showing less aggression than expected and the females showing more. The results for Location # 2 showed the males exhibiting slightly more aggressive interactions (52%) than the females (48%). This table clearly indicates that the significant result found between gender and aggression is directly attributable to Location.

Table 5 Gender and Physical Aggression through the Equipment.

	Male		Female		Totals	
	%	(N)	%	(N)	%	(N)
Low Aggression	48.3	(14)	47.5	(28)	47.7	(42)
High Aggression	51.7	(15)	52.5	(31)	52.3	(46)
Totals	100	(29)	100	(59)	100	(88)
			$X_1^2 = 0$		n.s	

Table 6 Gender and Aggressive Verbal Interaction.

	Male % (N)	Female % (N)	Totals % (N)
Low Aggression	54.8 (86)	60.2 (142)	58 (228)
High Aggression	45.2 (71)	39.8 (94)	42 (165)
Totals	100 (157)	100 (236)	100 (393)
		X_1^2 = 1.08	n.s

Table 7 Gender and Aggressive Physical Interaction.

	Male	Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	27.9 (29)	15.7 (28)	20.2 (57)
High Aggression	72.1 (75)	84.3 (150)	79.8 (225)
Totals	100 (104)	100 (178)	100 (282)
		X_1^2 = 6.03	p.025= 5.024

Table 8 Gender and All Categories of Aggressive Interaction by Location

	LOCATION # 1 % (N)	LOCATION # 2 % (N)	Totals % (N)
Aggressive Interaction by Males	35.3 (226)	52.4 (65)	38.1 (291)
Aggressive Interaction by Females	64.7 (414)	47.6 (59)	61.9 (473)
Totals	100 (640)	100 (124)	100 (764)

$X_1^2 = 13.29$ p.001 = 10.827

Tables 9 through 12 confirm the results found in Tables 4 through 8 by examining a value for gender and physical and verbal aggression by each location. The value for Gender and physical aggression through the equipment was not calculated because the cell frequencies were too low. As specified by the previous tables, the only significant result was found in Table 11, which examined gender and aggressive physical interaction in Location # 1. The result was significant at the .01 confidence level and rejects the null in favour of an alternative hypothesis stating that females would show more physically aggressive interaction at Location # 1.

Tables 13 and 14 present cross-sex and same-sex patterns of aggressive verbal interactions; both results were not significant. Although the females showed a higher frequency of same-sex interaction in Table 13, the percentages between male and female same-sex interactions were very similar. For example, as was mentioned in the discussion on frequency tables, females showed a frequency of 73 self-assertive verbal interactions, this figure represents at least two times the amount recorded for males (35). Expressed in terms of percentages of the categories of same-sex interactions, however, the differences are reduced. The frequency of 73 self-assertive verbal interactions represented 40.8 percent of the overall female same-sex aggressive verbal interactions recorded. The frequency of 35

self-assertive verbal interactions represented 35 percent of the male same-sex interactions. Table 13 suggests that females in this study are as likely to show aggressive verbal interactions with females as males are to males and since females have a higher overall interaction level, their frequencies are higher proportionately.

Table 14 indicates that females are as likely to show aggressive verbal interactions with males as males are to females. Here, the total frequencies are only different by one, suggesting that the levels of cross-sex aggressive verbal interactions are virtually the same.

Table 9 Gender and Aggressive Verbal Interaction in Location # 1

	Male	Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	51.5 (70)	57.9 (121)	55.4 (191)
High Aggression	48.5 (66)	42.1 (88)	44.6 (154)
Totals	100 (136)	100 (209)	100 (345)
		$X_1^2 = 1.23$	n.s.

Table 10 Gender and Aggressive Verbal Interaction in Location # 2

	Male	Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	72.7 (16)	77.8 (21)	75.5 (37)
High Aggression	27.3 (6)	22.2 (6)	24.5 (12)
Totals	100 (22)	100 (27)	100 (49)
		$X_1^2 = .45$	n.s.

Table 11 Gender and Aggressive Physical Interaction in Location # 1

	Male	Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	34.8 (23)	18.2 (27)	23.4 (50)
High Aggression	65.2 (43)	81.8 (121)	76.6 (164)
Totals	100 (66)	100 (148)	100 (214)
		$X_1^2 = 7.89$	p.01 = 6.635

Table 12 Gender and Aggressive Physical Interaction in Location # 2

	Male	Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	15.8 (6)	3.3 (1)	10.3 (7)
High Aggression	84.2 (32)	96.7 (29)	89.7 (61)
Totals	100 (38)	100 (30)	100 (68)
	$X_1^2 = 2.6$	$X^2c = 1.46$	n.s.

Table 13 Same-Sex Interaction and Aggressive Verbal Interaction

	Female - Female		Male - Male		Totals	
	%	(N)	%	(N)	%	(N)
Comply	14	(25)	15	(15)	14.3	(40)
Ignore	4.5	(8)	6	(6)	5	(14)
Self-Assert	40.8	(73)	35	(35)	38.7	(108)
Command	30.2	(54)	27	(27)	29	(81)
Threat/ Attack	10.6	(19)	17	(17)	12.9	(36)
Totals	100	(179)	100	(100)	100	(279)
			$X_4^2 = 3.21$		n.s.	

Table 14 Cross-Sex Interaction and Aggressive Verbal Interaction

	Female -Male	Male - Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	63.2 (36)	51.7 (30)	57.4 (66)
High Aggression	36.8 (21)	48.3 (28)	42.6 (49)
Totals	100 (57)	100 (58)	100 (115)
		$X_1^2 = 1.53$	n.s.

Tables 15 through 19 confirm the non-significant results which showed that there was no association between cross-sex and same-sex interactions and aggressive verbal interaction that were reported in Tables 13 and 14, by further examining cross-sex and same-sex aggressive verbal interactions by each location.

Tables 17 and 18 do support the finding in Table 14 that females are as likely to show aggressive verbal interactions with males as males are to females.

Table 15 Same-Sex Interaction and Aggressive Verbal Interaction in Location # 1

	Male - Male	Female - Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	53.7 (51)	57.8 (93)	56.3 (144)
High Aggression	46.3 (44)	42.2 (68)	43.7 (112)
Totals	100 (95)	100 (161)	100 (256)
		X_1^2 =.25	n.s.

Table 16 Same-Sex Interaction and Aggressive Verbal Interaction in Location # 2

	Male - Male	Female - Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	72.2 (13)	100 (5)	78.3 (18)
High Aggression	27.8 (5)	0 (0)	21.7 (5)
Totals	100 (18)	100 (5)	100 (23)
	$X_1^2 = 1.57$	$X_c^2 = 0.38$	n.s.

Table 17 Cross-Sex Interaction and Aggressive Verbal Interaction in Location # 1

	Female - Male	Male - Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	56.3 (28)	46.3 (19)	52.8 (47)
High Aggression	41.7 (20)	53.7 (22)	47.2 (42)
Totals	100 (48)	100 (41)	100 (89)
		X_1^2 = 1.62	n.s.

Table 18 Cross-Sex Interaction and Aggressive Verbal Interaction in Location # 2

	Female - Male	Male - Female	Totals
	% (N)	% (N)	% (N)
Low Aggression	88.9 (8)	64.7 (11)	69.2 (18)
High Aggression	11.1 (1)	35.3 (6)	26.9 (7)
Totals	100 (9)	100 (17)	100 (26)
	X_1^2 = 1.67	X_c^2 = 0.68	n.s.

The last three tables in this section examining the variable aggression, look at cross-sex and same-sex patterns with both verbal and physical aggression. All three tables show non-significant results. Although the same-sex interactions were higher than cross-sex interactions, the percentages of verbal and physical aggression for both were very close in all cells. Females were recorded as showing a little more verbal aggression with other females (51.4%) than with males (45.6%), and the reverse for physical aggression, with 54.4 percent towards males and 48.6 percent with females. The males on the other hand, showed less physical aggression with both males and females.

Of the 16 tables that examined the relationship between gender and aggression, three tables showed significant results. Tables 7, 8, and 11 all indicated that gender and aggressive physical interactions are not independent and that where an association between these two does exist, it is an association that does not fit the traditional gender stereotype. Indeed, this association suggests that the females at Location # 1 are more physically aggressive than the males. In all the other tables, the null hypothesis that there is no association between gender and aggression is accepted.

Table 19 Gender Patterns by Aggressive Verbal and Physical* Interactions

	Gender Interaction Categories				
Aggressive Interaction Categories	F-F %(N)	F-M %(N)	M-M %(N)	M-F %(N)	Totals %(N)
Aggressive Verbal Interaction	51.4 (179)	45.6 (57)	52.9 (100)	56.9 (58)	51.6 (394)
Aggressive Physical Interaction	48.6 (169)	54.4 (68)	47.1 (89)	43.1 (44)	48.4 (370)
Totals	100 (348)	100 (125)	100 (189)	100 102)	100 (764)

$X_3^2 = 2.431$ n.s.

* For Tables 19, 20 and 21 "Physical Aggression" includes both direct physical aggression and aggression through the equipment.

Table 20 Cross-Sex and Same-Sex Female Interactions by Verbal & Physical Aggression

	Female - Female	Female - Male	Totals
	% (N)	% (N)	% (N)
Aggressive Verbal Interaction	51.4 (179)	45.6 (57)	49.9 (236)
Aggressive Physical Interaction	48.6 (169)	54.4 (68)	50.1 (237)
Totals	100 (348)	100 (125)	100 (473)
		X_1^2 = 1.07	n.s.

Table 21 Cross-Sex and Same-Sex Male Interactions by Verbal & Physical Aggression

	Male - Male	Male - Female	Totals
	% (N)	% (N)	% (N)
Aggressive Verbal Interaction	52.9 (100)	56.9 (58)	54.3 (158)
Aggressive Physical Interaction	47.1 (89)	43.1 (44)	45.7 (133)
Totals	100 (189)	100 (102)	100 (291)
		$X_1^2 = .54$	n.s.

Statistical Tables Examining the Variable Cooperation

The patterns of cooperative interactions showed less variance in the present study than the patterns of aggressive interactions. Of the 12 tables examining the relationship between gender and cooperative interactions, only one table yielded a significant result. The tables do show that female same-sex cooperative interactions (371) were higher than male same-sex cooperative interactions (283), and Location # 1 had higher frequencies of cooperative interactions (666) than Location # 2 (329). These higher frequencies relate to the relationship between gender and location, females in Location # 1 had higher overall frequencies of interaction.

The relationship between "Kind of Help Offered" and gender was examined in Table 23. As mentioned above, the females showed moderately higher frequencies in offering both verbal and physical help. However, this table indicates that females were no more likely than males to offer verbal help, and males were no more likely to offer physical help than females.

Table 22 Cooperation and Gender Patterns

Categories of Cooperative Interaction	Gender Interaction Categories F-F %(N)	M-M %(N)	F-M %(N)	M-F %(N)	Totals %(N)
Ask Questions	13.7(51)	14.1(40)	17.4(29)	12.6(22)	14.3(142)
Respond to Questions*	12.7(47)	15.5(44)	16.2(27)	13.8(24)	14.3(142)
Offer Verbal Help	27.2(101)	24 (68)	25.7(43)	23 (40)	25.3(252)
Offer Physical Help	46.4(172)	46.3(131)	40.7(68)	50.6(88)	46.1(459)
Totals	100 (371)	100 (283)	100 (167)	100 (174)	100 (995)
			$X_9^2 = 5.894$		n.s.

* Includes all three response categories: Appropriate, Not Appropriate and No Response.

Table 23 Gender and Kind of Help Offered.

	Male	Female	Totals
	% (N)	% (N)	% (N)
Offer Verbal Help	33.0 (108)	37.5 (144)	35.4 (252)
Offer Physical Help	67.0 (219)	62.5 (240)	64.6 (459)
Totals	100 (327)	100 (384)	100 (711)
		$X_1^2 = 1.58$	n.s.

Table 24 Gender and Two Categories of Cooperation

	Male	Female	Totals
	% (N)	% (N)	% (N)
Ask & Respond to Questions	28.4 (130)	28.6 (154)	28.5 (284)
Offer Verbal & Physical Help	71.6 (327)	71.4 (384)	71.5 (711)
Totals	100 (457)	100 (538)	100 (995)
		$X_1^2 = 0$	n.s.

The effect of location on the relationship between gender and cooperative behavior demonstrates that location had a minor influence on this pattern. Although the students at Location # 1 showed much higher frequencies of cooperative interactions than the students at Location # 2, Table 25 indicates that between locations, the percentages of cooperative interactions for males and females were almost identical. At Location # 1, 45.6 percent of the cooperative interaction recorded was by males, and 54.4 percent was by females; Location # 2 showed 46.5 percent and 53.5 percent respectively.

Within-group comparisons suggests that there is some variance explained by the location. Table 26 presented Gender and Cooperation in Location # 1, the chi-square measure of independence was 2.92, where $p \leq .05 = 7.815$. However, the same measure for Location # 2, presented in Table 27, was quite close to a significant result, with a chi-square value of 7.12, where $p \leq .05 = 7.815$. In Location # 2, the differences between expected and observed cell frequencies showed males asking slightly more questions than expected (+5) and females asking less (-5). Greater differences were found in the "Offer Verbal Help" category, where males interacted less than expected (-9) and females interacted more (+9).

Table 25 Gender and Cooperative Interaction by Location

	Location 1 % (N)	Location 2 % (N)	Totals % (N)
Cooperative Interaction by Males	45.6 (304)	46.5 (153)	56.6 (995)
Cooperative Interaction by Females	54.4 (362)	53.5 (176)	43.4 (764)
Totals	100 (666)	100 (329)	100 (995)
		$X_1^2 = .03$	n.s.

Table 26 Gender and All Categories of Cooperation in Location # 1

	Male		Female		Totals	
	%	(N)	%	(N)	%	(N)
Ask Questions	13.4	(39)	18.8	(64)	15.5	(103)
Respond Appropriately to Questions	12.3	(36)	10.9	(37)	11.5	(73)
Offer Help (Verbal)	26.7	(78)	26.4	(90)	26.5	(168)
Offer Help (Physical)	47.6	(139)	44	(150)	45.7	(289)
Totals	100	(292)	100	(341)	100	(633)

$X_3^2 = 2.92$ n.s.

Table 27 Gender and All Categories of Cooperation in Location # 2

	Male	Female	Totals
	% (N)	% (N)	% (N)
Ask Questions	15.5 (23)	9.2 (16)	12.1 (39)
Respond Appropriately to Questions	10.1 (15)	8 (14)	9 (29)
Offer Help (Verbal)	20.3 (30)	31 (54)	26.1 (84)
Offer Help (Physical)	54.1 (80)	51.7 (90)	52.8 (170)
Totals	100 (148)	100 (174)	100 (322)
		$X_3^2 = 7.12$	n.s.

Tables 28 and 29 which present gender and "Kind of Help Offered" in each location, confirm the non-significant result found in Table 23. This suggests that males and females in both locations are as likely to offer verbal help as they are to offer physical help.

However, when the categories of cooperation are combined to show "Asking and Responding to Questions" as one category of cooperation, and "Offering Verbal and Physical Help" as another, Location # 2 shows a significant result. In Table 31, which demonstrated the significant relationship between gender and cooperation in Location # 2, the observed frequency for "Ask and Respond to questions" was higher than expected (+8) for males, and lower than expected for females (-8). The reverse relationship was true for "Offer Verbal and Physical Help", males showed a lower frequency than expected (-8) and females a higher (+8). This table suggests that we might reject the null hypothesis in favour accepting an alternate hypothesis which states that males will show more "Asking and Responding" type behavior and females will show more "Offering Help" type behavior.

Table 28 Gender and Kind of Help Offered in Location # 1

	Male % (N)	Female % (N)	Totals % (N)
Offer Verbal Help	35.9 (78)	37.5 (90)	36.8 (168)
Offer Physical Help	64.1 (139)	62.5 (150)	63.2 (289)
Totals	100 (217)	100 (240)	100 (457)
		$X_1^2 = 1.05$	n.s.

Table 29 Gender and Kind of Help Offered in Location # 2

	Male	Female	Totals
	% (N)	% (N)	% (N)
Offer Verbal Help	27.3 (30)	37.5 (54)	33.1 (84)
Offer Physical Help	72.7 (80)	62.5 (90)	66.9 (170)
Totals	100 (110)	100 (144)	100 (254)
		$X_1^2 = 2.615$	n.s.

Table 30 Gender and Two Kinds of Cooperation: Ask/Respond Behavior and Offer Help Behavior in Location # 1

	Male % (N)	Female % (N)	Totals % (N)
Ask & Respond to Questions	38.5 (87)	44.9 (122)	42 (209)
Offer Verbal & Physical Help	61.5 (139)	55.1 (150)	58 (289)
Totals	100 (226)	100 (272)	100 (498)
		$X_1^2 = 2.12$	n.s.

Table 31 Gender and Two Kinds of Cooperation: Ask/Respond Behavior and Offer Help Behavior in Location # 2

	Male	Female	Totals
	% (N)	% (N)	% (N)
Ask & Respond to Questions	28.1 (43)	18.2 (32)	22.8 (75)
Offer Verbal & Physical Help	71.9 (110)	81.8 (144)	77.2 (254)
Totals	100 (153)	100 (176)	100 (329)

$X_1^2 = 4.44$ $p < .05 = 3.841$

The last two tables examining the relationship between gender and cooperative interaction present patterns of asking and responding to questions. Table 32 specifically examines the relationship between asking questions and responding appropriately to questions in cross-sex interaction. The results indicate that males and females are equally likely to direct questions to the other sex, and also equally likely to respond appropriately to questions in cross-sex interaction.

Table 33 presents both same-sex and cross-sex interaction, with asking questions and all categories of responding to questions. The frequencies indicate that students do ask more questions of the same-sex. The non-significant result in this table suggests that in all categories of asking and responding behavior, the frequencies are higher for same-sex interaction and the frequencies for cross-sex interaction are almost identical for both categories of "Male to Female" and "Female to Male". The null hypothesis, which states that there is no relationship between the independent variable gender patterns (cross-sex and same-sex interactions) and the dependent variable, asking and responding behavior, is retained.

Table 32 Cross-Sex Interaction In Ask and Respond Appropriately to Questions

	Female - Male	Male - Female	Totals
	% (N)	% (N)	% (N)
Ask Questions	60.4 (29)	56.4 (22)	58.6 (51)
Respond Appropriate	39.6 (19)	43.6 (17)	41.4 (36)
Totals	100 (48)	100 (39)	100 (87)
		$X_1^2 = .19$	n.s.

Table 33 Gender Patterns by Ask and Respond to Questions

Categories of Cooperative Interaction	Gender Interaction Categories				
	F-F	M-M	F-M	M-F	Totals
	%(N)	%(N)	%(N)	%(N)	%(N)
Ask Questions	52 (51)	47.6(40)	51.8(29)	47.8(22)	50 (142)
Appropriate Response	32.7(32)	40.5(34)	33.9(19)	37 (17)	36 (102)
Not-Appropriate	10.2(10)	7.1 (6)	5.4 (3)	6.5 (3)	7.7 (22)
No Response	5.1 (5)	4.8 (4)	8.9 (5)	8.7 (4)	6.3 (18)
Totals	100(98)	100(84)	100(56)	100(46)	100(284)

$X_g^2 = 3.841$ $X_c^2 = 2.08$ n.s.

The last six statistical tables presented, examine the relationship between the independent variable gender and both categories of the dependent variable which are cooperative and aggressive interactions.

Table 34 shows a significant relationship between gender and cooperative and aggressive interactions at the confidence level of .001. This table however, suggests that we would reject the null hypothesis in favour of an alternate hypothesis which states that males are more cooperative than females, and females are more aggressive than males. The differences between the expected and observed cell frequencies indicate that males were more cooperative than expected (+34) and less aggressive (-34), while for females the reverse was found. In order to explore this relationship more fully, the following tables present these patterns as they are found in each location.

Table 35, which presented gender, and cooperative and aggressive interactions in Location # 1, confirmed the findings in Table 34. Table 36, which presented these patterns in Location # 2, showed a non-significant result and different distributions of frequencies from those found in Tables 34 and 35. In Location # 2, males were observed to show less cooperative behavior and more aggressive behavior and females were observed to show more cooperative and less aggressive behavior than would be expected if there was no association between these variables. However, these

differences were very slight (+5 or -5), and the result was non-significant with a chi-square value of 1.12. What is noteworthy about the distribution of frequencies in this table is that first, the same pattern is found in Table 39 (which is also Location #2), and secondly, that this pattern resembles "traditional gender stereotypical behavior".

Table 34 Gender and Categories of Cooperative and Aggressive Interactions

	Male	Female	Totals
	% (N)	% (N)	% (N)
Cooperative Interaction	61.1 (457)	53.2 (538)	56.6 (995)
Aggressive Interaction	38.9 (291)	46.8 (473)	43.4 (764)
Totals	100 (748)	100 (1011)	100 (1759)

$X_1^2 = 10.94$ p.001 = 10.827

Table 35 Gender and Cooperative and Aggressive Interaction in Location # 1

	Male	Female	Totals
	% (N)	% (N)	% (N)
Cooperative Interaction	37.4 (304)	46.6 (362)	51 (666)
Aggressive Interaction	42.6 (226)	53.4 (414)	49 (640)
Totals	100 (530)	100 (776)	100 (1306)
		X_1^2 = 14.69	p.001 = 10.827

Table 36 Gender and Cooperative and Aggressive Interaction in Location # 2

	Male % (N)	Female % (N)	Totals % (N)
Cooperative Interaction	70.2 (153)	74.9 (176)	72.6 (329)
Aggressive Interaction	29.8 (65)	25.1 (59)	27.4 (124)
Totals	100 (218)	100 (235)	100 (453)
		$X_1^2 = 1.12$	n.s

Tables 37, 38 and 39 present gender patterns (cross-sex and same-sex) with cooperative and aggressive interactions. The same patterns found in Tables 34, 35 and 36 are found here. Table 37 shows a significant result where chi-square is 4.23 and $p \leq .05 = 3.841$. This table shows less same-sex cooperative interaction than expected (-20) and more same-sex aggressive interaction than expected (+20). The opposite was found for cross-sex interaction, with more cross-sex cooperation (+20) and less cross-sex aggressive interaction (-20) than expected. Table 38, which examines these same variables in Location # 1, shows the same patterns, but slightly lower differences between expected and observed cell frequencies (+14 and -14) and a non-significant result of 2.91. This table suggests that for the significant result found in Table 37, the interaction of students at Location # 1 accounted for the majority of the distribution of frequencies. This is especially evident by the very low non-significant result found in Table 39, which examines these variables in Location # 2. The chi-square value in this table was .42 .

As was mentioned above, the pattern found in Table 39 is the same as that found in Table 36; again, the differences between observed and expected cell frequencies were very slight (+3 and -3).

Table 37 Cross-Sex and Same-Sex Interactions and Cooperative and Aggressive Interaction

	Same Sex	Cross Sex	Totals
	% (N)	% (N)	% (N)
Cooperative Interaction	54.9 (654)	60.0 (341)	56.6 (995)
Aggressive Interaction	45.1 (537)	40.0 (227)	43.4 (764)
Totals	100 (1191)	100 (568)	100 (1759)
		X_1^2 = 4.23	p.05 = 3.841

Table 38 Cross-Sex and Same-Sex Interactions and Cooperative and Aggressive Interaction In Location # 1

	Same-Sex	Cross-Sex	Totals
	% (N)	% (N)	% (N)
Cooperative Interaction	49.5 (458)	54.6 (208)	51.0 (666)
Aggressive Interaction	50.5 (467)	45.4 (173)	49.0 (640)
Totals	100 (925)	100 (381)	100 (1306)
		X_1^2 = 2.91	n.s

Table 39 Cross-Sex and Same-Sex Interactions and Cooperative and Aggressive Interaction In Location # 2

	Same-Sex	Cross-Sex	Totals
	% (N)	% (N)	% (N)
Cooperative Interaction	73.7 (196)	71.1 (133)	72.6 (329)
Aggressive Interaction	26.3 (70)	28.9 (54)	27.4 (124)
Totals	100 (266)	100 (187)	100 (453)
		X_1^2 = 0.42	n.s

To conclude this quantitative section the following four tables will present the independent and dependent variables expressed as percentages of all coded behavior and all coded aggressive and cooperative interactions. Following these, a brief summary of the quantitative findings will be presented.

Table 40 Gender and Cooperative and Aggressive Interaction Expressed as a Percentage of All Coded Behavior.

	Male	Female	Totals
Cooperative Interaction	26%	31%	57%
Aggressive Interaction	16%	27%	43%
Totals	42%	58%	100%

Table 41 Gender and Cooperative and Aggressive Interaction Expressed as a Percentage of all Coded Cooperative and Aggressive Interaction.

	Male	Female	Totals
Cooperative	46%	54%	100%
Aggressive	38%	62%	100%

Table 42 Percentage of All Aggressive Interaction by Gender and Location.

	Location # 1	Location # 2	Totals
Male	29.6%	8.5%	38.1%
Female	54.2%	7.7%	61.9%
Totals	83.8%	16.2%	100%

Table 43 Location and Percentage of All Behavior Coded

	Location # 1	Location # 2	Total
Percentage of all coded Interaction	74% (1306)	26% (453)	100% (1759)

Summary of Findings

Aggressive Interaction:

Table 7 Gender and Aggressive Physical Interaction

Null Hypothesis: Gender and Aggressive Physical Interaction are Independent.
$X^2 = 6.03$ where $p \leq .025 = 5.024$
Reject the Null Hypothesis
Retain the Alternate Hypothesis: Females will show higher aggressive physical interaction than males

Table 8 Gender and all categories of Aggressive Interaction by Location

Null Hypothesis: The relationship between Aggressive Interaction and Gender is independent of Location.
$X^2 = 13.29$ where $p \leq .001 = 10.827$
Reject the Null Hypothesis
Retain the Alternate Hypothesis: Location influences the relationship between gender and aggressive interaction.

Table 11 Gender and Aggressive Physical Interaction in Location # 1

Null Hypothesis: Gender and Aggressive physical interaction are independent in Location # 1.
$X^2 = 7.89$ where $p \leq .01 = 6.635$
Reject the Null Hypothesis
Retain the Alternate Hypothesis: Females will show more physically aggressive interaction than males at Location # 1.

Table 12 Gender and Aggressive Physical Interaction in Location # 2

Null Hypothesis: Gender and Aggressive physical interaction are independent in Location # 2.
$X^2 = 1.46$ n.s.
Retain the Null Hypothesis

General Description:

Other than the tables mentioned above, all of the tables examining same-sex and cross-sex aggressive interactions within each location resulted in non-significant findings. Female same-sex interactions were higher in every category of aggressive behavior coded than male same-sex interactions, except in verbal attacks, where males had a frequency of eight and females three. In cross-sex interactions, M-F and F-M aggressive interactions were almost equal in every category, except in two of the physical aggression categories: self-assert/command and attack. In these categories, the F-M frequencies were much higher than the M-F frequencies. In the self-assert/command category, the F-M frequency observed was 38, and the M-F score was 17. Physical attacks against the other sex showed females attacking males on 15 occasions and males attacking females on 1 occasion.

General Patterns:

Same-sex interactions are significantly higher than cross-sex. Female same-sex interactions are higher than male same-sex interactions in almost all categories of verbal and physical aggression. Location # 1 was much higher in all categories of aggressive interaction recorded than Location # 2. The females at Location # 1 were more physically

aggressive than the males at Location # 1. Otherwise, the null hypothesis, which states that there is no association between gender and aggression, is accepted.

Cooperative Interaction:

Table 27 Gender and All Categories of Cooperation in Location # 2.

Null Hypothesis: Gender and Cooperative interaction are independent in Location # 2.
$X^2 = 7.12$ where $p \leq .05 = 7.815$
Retain the Null Hypothesis
Note: an almost significant finding, resulting from differences between observed and expected cell frequencies in asking questions: males asked more (+5) and females asked less (-5) and offering verbal help: males offered less (-9) and females offered more (+9).

Table 31 Gender and two kinds of cooperation: ask/respond behavior and offer help behavior in Location # 2.

Null Hypothesis: Gender and ask/respond behavior and offer help behavior are independent in location # 2.
$X^2 = 4.44$ where $p \leq .05 = 3.841$
Reject the Null Hypothesis
Retain the Alternate Hypothesis: Females will show more offering help behavior and males will show more ask/respond behavior in Location # 2.

Table 32 Cross-Sex interaction in Ask and Respond appropriately to Questions.

Null Hypothesis: Cross-sex interaction and ask/respond behavior are independent.
$X^2 = .19$
Retain the Null Hypothesis

General Patterns:

Females observed in this study were not more cooperative than males in either same-sex or cross-sex interactions. Location # 2 showed different patterns of

cooperating that appeared as a very slight, but non-significant, tendency toward more gender stereotypic behavior. Males and females were equally as likely to ask questions and respond appropriately to questions to the other sex.

Other Tables:

Table 34 Gender and Categories of Cooperative and Aggressive Interactions

Null Hypothesis: Gender and cooperative and aggressive interactions are independent.
$X^2 = 10.94$ where $p \leq .001 = 10.827$
Reject the Null Hypothesis
Retain the Alternate: Males are more cooperative than females and females are more aggressive than males.

Table 35 Gender and Cooperative and Aggressive interaction in Location # 1.

Null Hypothesis: Gender and cooperative and aggressive interaction are independent in Location # 1.
$X^2 = 14.69$ where $p \leq .001 = 10.827$
Reject the Null Hypothesis
Retain the Alternate Hypothesis: Females are more aggressive than males in location # 1 and males and females are equally cooperative.

Table 36 Gender and Cooperative and Aggressive interaction in Location # 2.

Null Hypothesis: Gender and cooperative and aggressive interaction are independent in Location # 2.
$X^2 = 1.12$ n.s.
Retain the Null Hypothesis
Note: Females were slightly more cooperative (75%) than the males (70%) and the males were slightly more aggressive (30%) than the females (25%).

Table 37 Cross-sex and same-sex interactions and cooperative and aggressive behavior.

Null Hypothesis: Cooperative and aggressive behavior are independent from cross-sex and same-sex interactions.
$X^2 = 4.23$ where $p \leq .05 = 3.841$
Reject the Null Hypothesis
Retain the Alternate Hypothesis: There will be less same-sex cooperation and more same-sex aggression, and there will be more cross-sex cooperation and less cross-sex aggression.

Table 38 Cross-sex and same-sex interactions and cooperative and aggressive behavior in Location # 1.

Null Hypothesis: Cooperative and aggressive behavior are independent from cross-sex and same-sex interactions in Location # 1.
$X^2 = 2.91$ n.s.
Retain the Null

Table 39 Cross-sex and same-sex interactions and cooperative and aggressive behavior in Location # 2.

Null Hypothesis: Cooperative and aggressive behavior are independent from cross-sex and same-sex interactions in Location # 2.
$X^2 = .42$ n.s.

VI. Discussion

This research hypothesized that gender would influence the classroom interaction of young children using computers. Derived from the axioms of Symbolic Interactionism, the following hypothesis represented the general theoretical orientation for this research:

> If girls and boys in the early elementary grades have experienced and actively participated in gender stereotyped socialization, and they have identified with and, in consequence, have accepted such gender identities, they will show different behaviors and patterns of interaction to confirm and express those identities.

From the review of the literature, two broad concepts were selected to represent a range of behaviors characteristic of each sex-class. These were: cooperation and aggression. Goffman (1987) tells us that every society has an initial sorting of individuals into a "sex-class" whereby members of the two classes are subject to different socialization, given different treatment, and acquire different experiences. "In response there is objectively overlayed on a biological grid - extending it, neglecting it, countering it - a sex-class - specific way of appearing, acting, feeling" (:53). Whether or not "cooperation" and "aggression" are theoretically valid indicators of "gender influences" or the "sex-classes" as Goffman (1987) describes them, depends on empirical validation and theoretical understanding.

Turning now to the quantitative findings of this research, the following sub-hypotheses shall be examined in terms of empirical confirmation:

> (a) Boys will exhibit more aggressing behaviors than girls during computer activities with mixed-sex and same-sex groups.
>
> (b) Girls will exhibit more cooperating behaviors than boys during computer activities with mixed-sex and same-sex groups.

Based on the few significant results reported in the previous section, we may confirm that boys and girls did show some different behaviors and patterns of interaction. However, the results do not confirm hypotheses (a) and (b) above. The majority of the findings suggest that there was no relationship between gender and aggressive and cooperative behavior for the subjects in this study. The few significant results that were reported, found that girls were more physically aggressive than the boys in Location # 1, and that boys were as cooperative as the girls in both locations.

As previously discussed in this thesis, there are problems in defining and measuring "aggression". However, because the significant findings report on direct physical aggression it is not likely that they may explained away due to measurement problems. Direct physical aggression is the most easily observed and least likely to be based on "subjective" interpretation. The motives and intentions of aggressive behavior however, are subject to many conflicting

interpretations. The finding of girls being more physically aggressive than boys in Location # 1, and of boys and girls being equally aggressive in Location # 2, raises some important questions about the way aggressive behavior has been measured, analyzed and interpreted in previous research. If the boys at Location # 2 had been found to be more aggressive than the girls, then one could explain the findings of the girls in Location # 1 being more physically aggressive by simply stating that they were just a wild bunch (i.e, they don't represent the "average" girl) thus reaffirming the traditional stereotype.

In order to consider the possibility that the freqencies of interactions reported were based on the frequent behaviors of a one or two individuals, thus misrepresenting the group, an examination of the frequencies of individuals being observed at each coded session was conducted. In Location # 1, the students were identified by name on almost all coding sheets and this permitted a counting of how many times each student appeared in the tapes being analyzed. The results indicated that every student was observed on the tapes at least once, but there were three girls and three boys who tended to appear with higher frequency than the others (F1 = 9, F2 = 11, and F3 = 10 appearances and M1 = 8, M2 = 8, and M3 = 9 appearances). The majority of students were fairly equal in frequency of appearing, and three students appeared on the tapes rather

infrequently (F7 = 2 appearances and M10 and M11 = 1). The distribution of students appearing on the tapes in Location # 1 appears to be that which might be expected in the population, with a few students showing more interest than the others, the majority falling into a mid-range, and a few showing relatively little interest. That the videotaping occurred over half of an academic year suggests that this distrubution might account for periodic occassions of high and low interest.

Because of the limited interaction at Location # 2, students were not identified by name. Thus, the recording of frequencies of students appearing at the computers was different. In this classroom, the researcher recorded every time a different male or female sat down at the computers during one activity centre. These numbers cannot reveal which students were at the computers, only that there was a fairly high seat turnover during each activity centre recorded. There was an average of eight different boys and girls appearing at each activity centre. On two occasions, the seat turnover was much lower showing two males and one female during one session, and two females and one male at the other. The high seat turnover in this classroom suggests that the possibility of a few students accounting for most of the behaviors recorded is quite low. For both classrooms then, it appears that the observations recorded do not reflect the frequent behaviors of just a few

individuals, and that these observations may be accounted for by other variables. The finding of girls in one location being more physically aggressive than boys merits further discussion.

It is quite plausible that researchers' biases, and not positive evidence, have given rise to the entrenched finding of aggression being a predominantly male characteristic. Past research on aggression has relied heavily on lab-based measures, especially the electric shock episodes, according to Krebs and Miller (1985:5). That these frequently cited and published findings may have influenced other researchers is one possible explanation for research bias. Krebs and Miller (1985) question the validity of these aggression studies, and accurately point out, that "[f]ew individuals encounter the opportunity to zap a stranger with an electric shock outside a laboratory context" (:5).

Other research findings on classroom interaction have been based on anecdotal reports and studies not conducted inside the classroom. The possibility that observers have *attended* to the aggressive behavior of boys must also be a consideration for understanding research bias. Aggressive behavior that disrupts the classroom is likely to gain the attention of the teacher. This raises two important points: one, the influence of the teacher and classroom organization on the definition of aggression, and two, aggression that is

not loud or disruptive may not get noticed. Blumenfeld, Hamilton, Bossett, Wessels, Meece (1983) say that:

> ... [t]he primary attention in educational literature has been on sex differences in disruptive behavior, with girls coming out as "sugar and spice" by that criterion of fulfilling the student role. (:170)

Their research suggests that "teachers do not appear to be attending to boys because they are disruptors - although of course they might be attending to boys so as to prevent them from becoming disruptors" (:170). From this statement, we could surmise that based on their expectations of boys being more disruptive, teachers could be attending to their behavior more closely. Girls may be coming out as "sugar and spice" because they have different ways of interacting aggressively that are not so easily attended to. In the behavioral sequences reported in the previous section, Sequence # 5 illustrates these ideas quite well. In this specimen, two girls are playing "Shoot the Letter" on one computer, and two boys are playing the same game on the computer beside them. In this sequence, the boys are much louder and more demonstrative with their aggressive behavior. Peter yells at the computer screen "kill that sucker! I'll kill you!" and makes other statements like "I want you dead!", while Jacqueline quietly says to herself "I'm trying to kill Amanda here. Ohh yaa." There are numerous examples of the boys shouting statements like

"Agh! Got it. Shoot him! Kill him - I killed Steven. I killed Stephanie yeh!" (Joe and Adrian, AC, April 10).

Another observation made about the differences between girls' and boys' "aggressive styles" while playing "Shoot the Letter", is how they name the letters that they are supposed to shoot. The boys were found to give the letters personalized identities of fellow classmates as they match the letters (eg. above, when the letter "S" drops down, and Joe and Adrian give the letters the names of Stephanie and Steven). Girls, on the other hand, give each other's name, regardless of letter. The subtleties of "aggressive styles" may go unnoticed because of the lack of close observation of children over extended periods of time. The present research, in using videotapes to record the observations, found many behaviors that were initially unnoticed. Girl's aggressive interaction sequences, although frequent, were found to be very short in duration, and not very demonstrative. They appeared to be much more demonstrative in playful behaviors, such as giggling, laughing, squealing, clapping, dancing, bouncing and other forms of physical play.

Returning now to hypothesis a): Boys will *exhibit* more aggressing behaviors than girls during computer activities with mixed-sex and same-sex groups. We can now consider that if this hypothesis were true, boys might feel much safer and possibly the need for demonstrating or exhibiting

their aggressive behaviors. On the other hand, as Hollander (1985) was quoted as saying in the review of the literature, girls have not traditionally been encouraged to engage in physical aggression and, therefore, might feel somewhat constrained to be less obviously aggressive.

> [a]large part of the issue of women as leader is contained in outmoded ideas about activity and dominance. Although differences in these qualities have been observed between women and men in groups, the nature of the activity and its context are important. For instance, women show less physical aggression, bearing in mind that there is considerable cultural encouragement for boys to engage in physically aggressive contact sports, as Mead (1949) has long since noted. Girls may be "aggressive," but not as much in physical ways. Deaux (1976) contends that women are as active as men, but that the areas in which they may strive to achieve are different. With respect to being dominant, assertive, or competitive, women in mixed-sex company are often constrained to be less obviously so than men. (:520)

Hollander (1985) raises some other important issues that are particularly relevant to this research. These are "the nature of the activity and its context". Before discussing the classroom organization and computer activities, however, consideration must be given first to hypothesis (b) which states: Girls will exhibit more cooperating behaviors than boys during computer activities with mixed-sex and same-sex groups. The same ideas about "exhibiting" or "demonstrating" aggressive behaviors and different "aggressive styles", may be applied to the analysis of cooperative behaviors.

Boys may feel constrained to express the parts of the self that are associated with being "feminine", hence, they have different styles of helping, responding, and expressing affective states. In the present study, the girls and boys appeared to be equally cooperative during computer activities. Table 31 reports one significant result that may be seen as supporting some of the research on gender differences. It shows that boys in Location # 2 engaged in more "Ask/Respond" type behavior and girls engaged in more "Offering Help" behavior. We could view ask/respond behavior as task-oriented or instrumental, and offering help as interpersonally oriented or expressive in orientation. But past research on ask/respond behavior has made distinctions on the types of questions asked, where boys are said to ask more direct questions and show exclusivity in who they choose to respond to. This research did not measure the type of question asked, but it did measure response behavior. There was almost no association between cross-sex interaction and ask and respond appropriately to questions shown in Table 31. The chi-square value was .19 where $p \leq .05 = 3.841$. Contrary to the findings of Wilkinson et al. (1985) and Kenderski (1985), this research found no differences between girls' and boys' responses to questions from the other sex.

The high levels of cooperation found for both girls and boys in this study did not support the observations of

Carmichael et al.(1985) and Larter et al.(1983), who reported on cross-sex conflicts or boys being too aggressive when paired off with girls during computer activities. Tables 37 and 38 reported that there was more cross-sex cooperation and less cross-sex aggression than expected, and less same-sex cooperation and more same-sex aggression than expected. The differences were great enough to yield a significant result of $X^2 = 4.23$ where $p \leq .05 = 3.841$. Given the preference for same-sex interactions, which was quite evident in this research, we may surmise that the higher frequencies of interaction lead to more opportunities for conflict. How the students and teachers perceive, manage and respond to this conflict might possibly explain different findings of cross-sex conflict in past research and more cross-sex cooperation in this research.

Other than raising the question of researcher bias, selective perception and expectations of teachers, and different gender-specific styles of interacting "aggressively" and "cooperatively", there are two essential observations found in this research that contribute to an understanding of the unique findings. The structure of classroom organization and the nature of computer activities have emerged as having a greater influence on childrens' behavior in the classroom than "gender".

The two classes observed in this research may be described as exhibiting a traditional structure (Location #

2) and a non-traditional structure (Location # 1). As mentioned in the Findings chapter, it may be more useful to label stuctures more clearly by addressing the kinds of patterns within the structures. Thus the "traditional" or "structured" classroom may be described as showing an "apriori imposed structure" and the "non-traditional" or "unstructured" classroom may be described as a "negotiated structure". These classes were shown to differ in many ways pertaining to authority, rules, the enforcement of rules, and activity levels. The differences in overall interactions observed at each school were remarkable. Location # 1 was responsible for 74 percent of all coded behavior in this study, and Location # 2 had the remaining 26 percent. These differences are further exemplified by the percentage differences in all coded aggressive interactions, where Location # 1 was responsible for 84 percent and Location # 2 for 16 percent. Because the teacher at Location # 2 did not permit the children to talk above a whisper, it was to be expected that aggressive interaction would be severely constrained. The total number of aggressive interactions recorded at Location # 2 was 124 and the total number of cooperative interactions was 329. Location # 1 had much higher frequencies for both, with 640 for aggressive interaction and 666 for cooperative interaction.

The task structure and student role structure implemented in Location # 2, also affected cooperative

behavior. As mentioned in the previous section, the teacher discouraged peer tutoring and preferred that students work quietly at their own computers. Slavin (1983) suggests that this practice is quite common:

> In the classroom, and almost nowhere else, peers are often actually forbidden to help one another, and they are rarely encouraged to offer help. (:341)

Initially, it might appear that the teacher at Location # 2 has been quite successful in keeping order and good behavior in her classroom, especially when we think of 640 aggressive interactions compared to 124. But, there may be sacrifices made at the expense of order and control which must be evaluated.

Measured by the teachers' evaluations of students, the two classes differ significantly on distribution of grades and interest level in computers (see Appendix D). Students at Location # 1 show higher grades in computers, and overall academic performance, and higher interest levels. Based on observations and coding of videotaped data, interest and skill levels are markedly different in the two classrooms. In Location # 2, the students were not permitted to change the software until the end of the academic year, consequently they had limited exposure to software and no practice at changing these. For months at a time, the same two computer games appeared on the screen during the coding of videotapes. At the end, when students were permitted to

change the software, they were so inept at it, they would take the whole class to load and usually lost interest.

Observations about interest levels may be inferred from the "holding power" the computer activities had on the children. At Location # 1, there was only one occasion when the two computers were unoccupied, which was when the gerbils had babies, even then, the computer seats were vacant for only a few minutes. At Location # 2, on the other hand, seats were vacant on virtually every coding session. Quite often, both seats were vacant for as long as 10 minutes. With interest levels appearing to be quite low, and amount of interaction permitted to be similarly low, the quality of the interactions during computer activities was also necessarily limited.

The rich behavioral sequences provided in the previous section all came from Location # 1. During these sequences, children showed a wealth of interactional experiences, both social and academic. During these interactions, elaborate meanings, roles and rules were established. For example, students established patterns of dominance based on seat position (the person sitting directly in front of the keyboard was "boss"), partner-selection (the "picker" had more rights and control than the "pickee") and skill level. Turn-taking was a central rule governing the interactions, in which different variations in the turn-taking rule changed the whole atmosphere of the game. For example, in

behavioral sequence # 1, Julie, who rated high on the dominance scale by virtue of her seat position and skill level, changed the turn-taking rule from "each person gets a turn after the other goes" to "each person gets a turn after the other goes only if you're fast enough". This changed the whole meaning of the game from cooperative to competitive. That these students were given the opportunity for rich interactional experiences based on rule-making, rule-breaking, conflict management, turn-taking and negotiating, and the permission to express a wide range of affective behaviors, is thought by many researchers to be highly beneficial both cognitively and non-cognitively. (e.g., Slavin, 1983; Lepper, 1983; Wang, 1983; Johnson and Johnson, 1975 & 1983; Johnson, Johnson & Stane, 1985)

The differences observed between the two locations in this study relate to two recent trends in the education literature. These relate to the structure of the learning environment and how these structures influence or determine locus of control. Although these structures are generally referred to as traditional/non-traditional or structured/unstructured, as discussed earlier, attempting to describe the type of structure may be more meaningful. Location # 1, which is described as showing a negotiated structure, appears to encourage cooperative learning and an internal locus of control, through students having the opportunity to negotiate with both the teacher and their

peers. Location # 2, which is described as showing an apriori imposed structure, appears to encourage individualistic learning and an external locus of control, because the students have very little control in this environment and peer interactions are similarly constrained. Recent research is focusing on the hidden costs of extrinsic rewards on intrinsic motivation, future task performance, self-esteem, and subsequent learning (Lepper, 1983).

A great deal of positive statements are being made about internal locus of control in the classroom. Wang (1983) tells us that:

> Extensive research on locus of control suggests that internal locus of control tends to be associated with positive attitudes towards mastery and competence behavior. (:214)

An internal locus of control is related to tendencies to seek information and use information in problem solving and to persist in difficult intellectual tasks. In contrast, students with an external locus of control tend to be relatively passive, compliant, non-exploratory and inattentive (Wang, 1983:213-214).

Johnson, Johnson and Stane (1985) examined the effects of cooperative, competitive and individualistic goal structures on computer-assisted instruction. They found many benefits of computer-assisted cooperative learning: it

> ...promoted higher quantity and quality of daily achievement, greater mastery of factual information, greater ability of apply one's factual knowledge, and greater ability to use factual information to answer problem-solving

> questions...Cooperation also promoted greater motivation to persist...students cooperating with one another outperformed those competing with one another or working individualistically. (:674-676)

Johnson et al.(1985) also found that competitively structured learning environments were especially detrimental for girls. They say that :

> If educators wish to promote girls' success in using computers and positive attitudes toward working with computers, computer-assisted cooperative learning situations should be emphasized. (:676)

The present research found that in Location # 1, the girls did quite well in competitive games. Although their competitive styles may have differed, competition did not seem detrimental in any manner to these girls. However, in this class, the teacher let the students decide their own structure at the computers. They generally played cooperatively and competitively many times throughout one activity centre period. It was only on very few occasions that students worked individually, and on those occasions, there was one computer designated for individual work so that students could print a story, and the other computer had two or more students playing together at it. At Location # 2, the students almost always played at the computers individually.

From the above discussion, we can conclude that the classroom organization has a significant impact on the kinds quantity of interaction permitted. The apriori imposed

structure in Location # 2 is associated with very low levels of interaction, lower grades and lower interests in computers. That these findings may be related to a learning environment which promotes an external locus of control and individual task structures, is one possibility meriting further research. The negotiated structure in Location # 1 is associated with very high levels of interaction, higher grades, and higher interest levels. What is not so readily understood is why the students at Location # 1 seemed more willing to express non-traditional gender behavior.

Two reasons may answer this question. First, the social setting in a negotiated structure allows a great deal of affective expression and personal control. Students may feel safer to express and/or explore different behaviors. Second, the computer is an object which may not yet be defined by such young children to be gender-related. In other words, children this young may not have discovered that the computer has been defined as a masculine object that is associated with the sciences. For them, the computer may be a gender-neutral object. In this social setting where students are highly motivated and interested in the computer, the computer activities may elicit a broad range of affective, social, and intellectual opportunities. In this context, the rich interaction during computer activities might be an unprecedented occasion for boys and

girls to discover and express parts of the self that had not yet been realized.

Such discovery and expression is due to both the nature of the rich interactional experiences in an unstructured learning environment, and to the highly evocative nature of the computer.

Turkle's (1984) book entitled The Second Self describes the projective, interactive, and highly evocative nature of computers. She discusses the computer's "holding power" and sees the computer as an "evocative object" which is partner in a great diversity of relationships (:14-15).

> Technology catalyzes changes not only in what we do but in how we think. It changes people's awareness of themselves, of one another, of their relationship with the world. The new machine that stands behind the flashing digital signal, unlike the clock, the telescope, or the train, is a machine that "thinks". It challenges our notions not only of time and distance, but of mind. (:13)

Based on hundreds of interviews with children and adults over a seven year period, Turkle (1984) concludes that "...the machine can act as a projection of part of the self, a mirror of the mind...It is a constructive as well as a projective medium" (:15). Thus the computer may viewed as an object which, by its marginal, evocative, and interactional nature, provides opportunities for the expression and projection of the self. Symbolic interactionists point out that objects such as the computer have no intrinsic meaning, "but the meaning of objects lie

in our plans of action - defining objects is ever changing" (Denzin, 1970:7). In the two classrooms observed for this study, the computer is defined differently as a social object through the interactions of teacher and students at each setting. In Location # 1, the computer emerges as "partner in a diversity of relationships", through anthropomorphizing and through its recruitment as a group member in triadic and dyadic relationships. Furthermore, in this classroom the degree of personal control seems to have allowed the computer to have great "holding power" over the children in this class. Hence, they are highly motivated to master, create, explore and play with this technology.

The computer in Location # 2 is defined quite differently. Firstly, in the apriori imposed structure of this learning environment, students have limited personal control. This may have contributed to a lack of interest and motivation for computer activities. The computer in this classroom has very little, if any, "holding power". As a socially defined object, the computer is somewhat like other pedagogical props or supplies.

In order to form a relationship with computers, children must have the opportunities and freedom to explore and interact with the machine. Although the children at Location # 2 are given the opportunity to form a relationship with computers, the constraints on their learning environment do not encourage them to do so. The

implications for the students at Location # 2 are that they are denied the rich interactional experiences and the opportunity to interact with the computer as a highly evocative object. Unlike the students in Location # 1, they do not have the chance to discover and express different parts of the self that might emerge in this rich and stimulating environment. If we consider that "[c]hildren working with computers are a microcosm for the larger world of relations between gender and science" (Turkle,1984:18), then educators might consider the differential experiences children receive during classroom interactions at the computers that specifically relate to classroom organization and pedagogic practices.

The above discussion shows that the two sub-hypotheses were not empirically confirmed by this research. Had they been formulated to consider both the socially constrained and determined part of the self and the emergent and novel part of the self, they might have represented the theory and empirical world more accurately. As they were formulated, it is now evident that they did not leave room for the emergent and novel part of the self that arose through the rich and stimulating interactions at the computers.

VII. Conclusions

This research reports four general findings that challenge previous research. These are: girls were more physically aggressive than boys (in Location # 1); there were no differences in cooperating behaviors between girls and boys; evidence of high levels of cross-sex cooperation; and no evidence of differences in asking and responding appropriately to questions by the other sex. However, the previous findings of preference for same-sex interactions was confirmed by this research.

Researcher bias, selective perception and expectations of teachers, and different gender-specific styles of interacting "aggressively" and "cooperatively" that have gone unnoticed due to flaws in observational research, are put forward as possible explanations.

However, the structure of classroom organization and the unique and highly evocative nature of computer activities have emerged as having a greater influence on children's behavior in the classroom than "gender". The relationship examined in this research attempted to observe how "gender" influenced the classroom interaction of young children using computers. From this study it is now evident that the question should have been how the classroom interaction at the computer influenced gender expression. The rich interaction during computer activities at Location

1 was found to be an unprecedented occasion for boys and girls to discover and express parts of the self, which are not usually expressed. Symbolic Interactionists tell us that it is through problem solving in joint action that people introduce change and novelty into the world. The combination of a learning environment based on negotiated structures, where students are given the freedom to express and develop relationships with each other, and the highly evocative object called the computer, provides a fertile environment for the emergent and novel aspects of the self. In this environment, the emergent and novel aspects of change appear not only through the process of cooperative interaction but also in the process of conflictual interactions. Thus, the limitations imposed on students in a learning environment characterized by an apriori imposed structure, may limit the students opportunities for growth in both cooperative and conflictual interactions. Consequently, the opportunity for changes in gender identities and attitudes towards gender stereotyping might also be limited. On the other hand, in a learning environment which permits negotiated structures to appear, the chances for emergent and novel experiences that may contribute to a change in gender identities and attitudes towards gender sterotyping might possibly be introduced.

Placed in the broader spectrum of gender studies, this research might easily be construed as support for the social

construction of gender. In part, this is true. That the structure of the learning environment and the social symbolic processes surrounding that marginal object called the computer were shown to have a decisive influence on the expression of gender might point rather convincingly at gender's socially constructed aspects. However, during the course of this research, a conspicious gap in the literature and theory has emerged which questions the idea of gender as *exclusively* a socially constructed phenomenon.

Certain factions of the feminist literature and all of the symbolic interactionist literature reviewed, showed a clear anti-biological orientation. Using Symbolic Interactionism, this research formulated hypotheses which conveyed that the child was an active participant in his or her socialization, and that this socialization represented the socially constrained and determined elements of developing selves. The sub-hypotheses were shown not to leave room for the emergent and novel aspects of the self, which was not a fault of the theory, but this researcher's presentation of it. But, there is still one question, not presented in the theory, which might have been included in the hypotheses. What are the biologically constraining and determining aspects of the self?

During the course of observations in this study, a few questions arose that pertained to the biological aspects of self. These were: how can one know if any biological factors

such as fatique, illness or pain are contributing to the behaviors one is observing? For example, a child with a cold might be inclined to more aggressive and less cooperative behavior than usual. Similarly, are other biologically related factors such as stress and improper nutrition contributing to the behaviors observed? Furthermore, what biological influences might emerge as the children got older, especially towards adolescence? This question was particularly intriguing in retrospect of the literature which has reported a clear difference in interest and skill level with computers at this age. These questions, combined with the observation of a somewhat anti-biological bias in the sociological literature, provoked further questions.

In order to examine this question and explore the anti-biological orientation in the theory, the writings of early Symbolic Interactionists were reviewed. In Mead's work Mind, Self and Society (1934), we are told that the mind and self arise in the process of social conduct through the conversation of gestures (:134). Although it has been suggested that Mead sought to avoid the dualism of mind and body, it appears that the interpretation of Mead's pragmatism has ignored the biological organism. Hewitt (1984) tells us that:

> ...Mead sought to avoid the dualism of mind and body that had plagued philosophy, a dualism that led people to separate the physical organism from "intelligence", and to imagine the latter as existing within some ethereal realm of ideas. For him, mind, body and conduct were inseparable

> aspects of evolution that had produced a uniquely human life form. (:9)

Mead's work was an insightful compromise to biological determinism and strict behaviorism. However, the biological organism seems to have been given only an honourable mention in Mead's work, and the rest of symbolic interactionism to follow. Once the "biological individual" was transformed into the "minded organism" through the agency of language and internalization of the conversation of gestures (Mead, 1934), the biologic individual ceased to exist in Symbolic Interactionist's theory.

Mead (1934) tells us that the self has a character which is different from that of the "physiological organism proper", and that we can distinguish very definitely between the self and the body (:135). One of the differentiating characteristics was said to be that the self could be an object to itself, and this reflexive characteristic of the self which could be both subject and object is what distinguishes the self from the body (:135-137). Further justification for this distinction is given by the fact that

> ...We cannot get an experience of our whole body...The parts of the body are quite distinguishable from the self. We can lose parts of the body without any serious invasion of the self. The body does not experience itself as a whole, in the sense in which the self some way enters into the experience of the self. (:136)

It can be argued that we can get an experience of our whole body, although disintegration of the self, which Mead does talk about, is likely to prevent or impede this.

Contemporary symbolic interactionism has diverged slightly from Mead in suggesting that for many people, the loss of a part of the body *is* a serious invasion of the self. Moreover, the reflexive character of the self reveals itself in exactly the same manner for the body. Consider the following: I am a self (subject); I have a self (object) and I am a body (subject) and I have a body (object).

If we look to the "genesis of the self" in symbolic interactionism, we see that the self is not there at birth but arises in the process of social experience and activity (Mead, 1962:144-149). It is of course, quite plausible to offer an alternative speculation on the genesis of self. We may consider that the infant is a self, which is primarily a biological self, but nonetheless social. Although the infant does not communicate with *adult* language symbol systems, it does clearly communicate and interact using the symbolic language of body and emotion. That the *socially* self-conscious self does not appear at birth, does not necessarily indicate the lack of a self, just a self in a different state of development. It is true that we cannot possibly know what the infant is conscious or not conscious of, or that it is not conscious of itself. We do know that the infant does not communicate self-conscious behavior in a way that we can understand, and that the infants behavior is decidedly self-centred, which suggests to us lack of social consciousness. Another interpretation of the self may be offered: the self

at birth is growing and expanding through social experience by incorporating more "other" selves into its development and thus reflecting and communicating such development in different and more socially broadened manners.

These alternative speculations and interpretations of the self as a biological being are put forward as a challenge to sociology to consider the incorporation of more research on biological phenomenon in social behavior. Although some authors have researched these matters on a cultural level of analysis, they represent a rather small percentage of the sociological literature. Placed on a spectrum of sociological literature which shows a small percentage focusing on biolgocial determinism on the one side and complete social constructivism on the other, this researcher is suggesting a little more balance might be in order. Human social life is as far from being biologically pre-determined as it is from being *exclusively* socially determined. The "I" and the "Me" are two complementary and inseparable aspects of a self which is at once biological and social. This self is socially and biologically constrained and yet socially and biologically creative, spontaneous and able to act on both the social and biological constraints to produce change through the emergent and novel aspects of the self. That future research should include the biological organism in more

social theory is recommended, although this task may be formidable.

This research concludes that observational research in the classroom, which attempts to record and anlayze actual behavior and interaction patterns, may contribute significantly to our understanding of social conduct. Furthermore, the findings reported here suggest that the classroom structure should not be left out of such observational studies. The importance of this variable was not mentioned in the few studies which did report classroom observations. Educators might consider the beneficial effects of using computers in an unstructured learning environment for personal, social and cognitive development that appears to be enhanced in a rich and stimulating enviroment with groups of children using computers. That significant contributions toward healthier gender identities might be facilitated through interactions during unstructured computer activities might also be considered.

> This research on two small elementary classrooms cannot be considered representative of any social processes other than those observed. However, the rich interactional data in combination with the videotaped observations and subsequent findings of association between gender and cooperative and aggressive interactions, provide a useful basis for further exploration. In summation, the few significant results reported in this research and the majority of non-significant results provide not answers, but many questions.

Appendix A The increasing knowledge of sex-stereotype items found by Williams and Best (1982) across cultures.

At age five: The children were aware that Females were supposed to be gentle and affectionate, and that Males were strong and aggressive.
At this level, knowledge of male items exceeded that of female items, but by age eight, knowledge of both Male and Female items was equal, suggesting that between five and eight children learn more female stereotype than male stereotype items. (:190)

By age eight: Their ideas had expanded to include: Females considered weak, emotional, appreciative, excitable, gentle, softhearted, meek,and submissive. Males disorderly, cruel, coarse, adventurous, independent, ambitious, loud and boastful.(:190)

By age eleven: Females talkative, rattle brained, complaining.
Males confident, steady, jolly, however, by age eleven, the children still had not identified all the focused sex-stereotype traits that adults had identified, and the authors concluded that children continue to develop their sex stereotypes into adolescent years. (:25)

Appendix B

Munroe and Munroe (1980:271) found the following generalities in adult sex-typed behaviours across cultures:

1. Sexual division of labour.
2. Male aggression.
3. Male involvement in warfare.
4. Male dominance of military and political positions.
5. Primary female responsibility for child care.
6. Sex differences in six classes of child behaviour: nurturance, responsibility, obedience, self-reliance, achievement and independence.
7. Deference behaviour by wives to husbands in three of every four societies - but never by husbands to wives.
8. Male instrumentality and female expressiveness (sometimes neutralized, but never reversed).
9. Crying as an expression of grief displayed more by females in one half of societies and by both sexes equally in the other half.(cited in Williams and Best, 1982:231)

Appendix C Description of Coding Categories Used by Researcher During Coding Process.

COOPERATION: VERBAL

1. ASK Q : This includes all verbal asking behavior.

Ask for help
Ask for answer
Ask for response
Ask how, what, why, or when questions.
Statements, phrases or utterances asked like a question.
Included in this category is also any kind of bargaining, or negotiating with another to get help or get the answer requested.

Procedure: The questions do not have to be asked in proper question structure. If it is determined by the coder that the interactants both respond as if the utterance is a question, it shall be coded as a question. In instances where there is one student at the computer with one or more at the other computer and it can't be determined wether the question is directed at someone or is self-referent behavior, it will be coded as a 5 or 6 for self or alone.

2. **RESPOND TO QUESTIONS:** There are three possible categories of response to questions:

1. Appropriate	Which is to give the information or answer requested.
2. Not Appropriate	Which is to reply with something other than the requested information or answer. To refuse to give an answer is also an example of a not-appropriate response.
3. No-Response	

3. **OFFER HELP:** Offering help occurs when a student offers an answer, advice, procedure or reminder without having been asked. **Very often, this kind of help, involves assisting in the spelling of a word.** Wether or not this offering help is coded as cooperation or aggression must be determined by the coder. Sometimes, one student gives another the answer, and the other is outraged. In this case, the coder must determine, if possible by the

nature of the interaction and the structure of the utterance, if the one doing the offering was being intentionally offensive to the other. If so, this would be coded as a aggressive verbal command (i.e., directing the actions of others).

For example: Two students are working together at computer II. They are loading "Haunted House". Student A is doing the typing on the keyboard and must type "Haunted House" as part of the load procedure. Student B is offering help by saying " H O U...". Student A is outraged as says loudly, " I know how to spell HOUSE! ". In this case, it appears that student B was just offering help and as such, would be coded as that.[13] Student A's response, however, would be coded as self-assertive aggressive verbal behavior.

COOPERATION - PHYSICAL

4. **OFFER HELP:** The behavior in this category, is subject to the same evaluation by the coder as the above verbal categories. Offering help by pressing the appropriate key for another person or pointing to the screen can sometimes be interpreted as aggressive behavior by that person. The same rule of interpretation applies : if it appears that one student was trying to help, the behavior will be coded that way, the second students response will be coded accordingly.

1. POINT OWN SCREEN	(to clarify, show where the cursor is, point to the instructions etc.)
2. POINT OTHER SCREEN	(same as above, but refer to screen other than the one where one is sitting)
3. PRESS/POINT OWN KEYS	(refers to helping behavior of one person to another at the same computer i.e. two students working at one

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13 In this research, if it appears that a child was trying to help and the other person was offended, the behavior will be coded exactly that way. However, if the research involved the interaction of adults, the behavior could end up being coded slightly differently. In the example above, if person "B" was an adult, the behavior might be interpreted as controlling, arrogant or insensitive. Indeed, even in children, offering help could indicate a "caretaking" type of personality which may be overly controlling and insensitive. This research is primarily concerned with overt behavior and general patterns and, therefore, will not focus on these issues.

computer, taking turns, and one helps the other when it is not his/her turn. This category also includes instances where one student is literally holding the hands or fingers of the other student to help them find or press various keys.)

4. PRESS/POINT OTHER KEYS (refers to the same helping behavior discussed above- but indicates that the helper is sitting at one computer and helping someone at the other.)

5. LOAD, CHECK, COMPUTER OR PRINTER

Although it is difficult to determine whether this kind of behavior is helping behavior, or behavior showing dominance, initiative, or goal-directed behavior all instances of this behavior will be recorded in this category. Because of the difficulty in coding this behavior, the codes shall be slightly different from the other categories. In all other categories, the first number in the code indicates the gender pattern of interaction, specifying which gender is doing the initiating or behavior and which gender is receiving it. In instances of load or check the computer, the same numbers for gender patterns will be used, however they will simply indicate the composition of students at that particular computer. For example, a M and a F are sitting at computer I. The male decides to check the tape. This would be coded as a 4-5 which indicates a male and a female, the male(4) is doing the checking.

CONFLICT-AGGRESSIVE VERBAL

NOTE: ALL THE BEHAVIORS CODED IN THE CATEGORIES OF AGGRESSIVE BEHAVIOR INCLUDE BOTH INITIATED ACTS AND RESPONSES TO THOSE ACTS. THE SCALES ARE ORDERED IN THAT THE LEAST AGGRESSIVE BEHAVIORS ARE INDICATED BY NUMBER 1 AND THE MOST AGGRESSIVE BY THE HIGHEST NUMBER IN THAT

CATEGORY. HENCE, EACH CATEGORY REPRESENTS A SPECTRUM OF AGGRESSION WITH BOTH THE INTERACTANTS BEHAVIORS.

Other procedures: All instances of direct physical attacks and verbal attacks will be recorded. There are many instances of playful aggression will not be recorded as aggression. The definition of aggression used in the coding categories involves the physical and verbal attempts to control anothers behavior and/or to inflict harm on another.

1. **COMPLY** Compliance refers to any kind of verbal statements of giving-in, accepting defeat, surrendering or agreeing to another's **AGGRESSIVE** behavior.

2. **SELF-ASSERT** To state or declare forcefully or aggressively **ONE'S OWN** intention or abilities. This also includes **SELF** protective behavior, like defenses, protests or rejecting the help of another. Demanding a response or answer also falls into this category. For example, most statements that begin with " I'm" or "I" will be coded in this category. E.g., "I'm sitting here!; I'm loading it! or I know how to spell House!"

3. **COMMAND** To direct the behavior or actions of **OTHERS**. To give ORDERS. Most statements of this sort begin with or imply the other person is the object of the behavior. E.g., "You can go next! No! Don't do it that way! You do the typing!" If a statement involves both a command and a self-assertion eg. You do the typing, I'm going to load it! - it would be scored two times, one of each.

4. **THREAT** An expression of intention to use more powerful forces or to inflict injury or damage. E.g., "I'm telling the teacher" or "If you don't let me, Ill hit you with this" or "I'm changing the tape if you do that; I'm turning the computer off...."

   There are three main types of threats used which should be indicated on the code sheet. These are:
   T - for threats involving the teacher
   C - for threats involving the computer

O - for other threats, usually involving physical attack.

5. ATTACK To assail with bitter, unfriendly or personally damaging words. E.g., "You're a stupid dummy! or You're a big baby...or I don't like you cause your a hog and you're mean and you tell lies". When this type of attack occurs, note the specifics on the back of the score sheet.

CONFLICT-AGGRESSIVE PHYSICAL

1. ESCAPE/WITHDRAW
When someone escapes or withdraws, they sit back and do not watch or get involved in the computer activity. This category involves an extreme passive response to aggression. The difference between this category and **COMPLY** is that the person complying is still actively involved, and usually waiting for the next available chance to jump in or take their turn. With escape and/or withdrawal the person is out of the current interaction and this is evident by their sitting back and looking elsewhere in the classroom.

2. COMPLY To comply, on the other hand, means to give in temporarily. To admit defeat or to accept the dynamics of the interaction and wait for ones turn.

3. SELF-ASSERT/COMMAND This behavior involves moving another's hand or arm away from oneself or away from the computer. It is using aggression, primarily against the others body.

4. THREAT To physically threaten to use more powerful forces or to inflict damage or injury. For example, to raise a fist to someone's face. Also in this category is to raise the hand as a threat to call the teacher. To hold an object in a threatening way, as if to hit someone also falls into this category. As threats where identified above, they will be similarly scored here. Except for threats relating the computer, which will be scored separately in the next column.

T - raise arm to call teacher
O - other threats, not including the computer. E.g., threats of violence.

5. ATTACK

Involves all hitting, pushing, shoving or grabbing of another persons body.

CONFLICT - AGGRESSIVE THROUGH EQUIPMENT

1. **SELF-ASSERT/COMMAND**
   This involves all forms of **SELF ASSERTIVE OR COMMANDING** behavior involving the computer, printer, tapes or other computer equipment.

   DOMINATING THE KEYBOARD (for example, typing while holding one arm up as a block to keep the other person off- also, not respecting the turn-taking system and requests, demands, pleas of the other person sharing the computer).

   TURN COMPUTER OFF This is usually done as an act of aggression.

   BLOCK THE KEYS Different from the dominating the keyboard, when the keys are being blocked, nobody can use them. It is usually done by one person with both arms folded across the keyboard.

   POINT TO OTHERS SCREEN in a hostile or aggressive manner,usually to make fun of their score or work.

   HIT OTHERS/OWN KEYS to intentionally mess up their computer or game or work on screen. Hit others keys when they have clearly indicated not to.

2. **THREAT** Threats involving the computer generally involve putting ones hand on the on/off switch. This is interpreted as an expression of intention to use more powerful forces or to inflict injury on the other person by ruining their game or work on the computer.

3. **ATTACK** This category refers to a physical attack on the equipment or the hitting of another person with the equipment.

Appendix D Grades and Interest Levels for Computers in both Locations.

Location # 1:

Overall Academic Average:

6 A's	(2 M and 4 F)
7 B's	(4 M and 3 F)
2 C's	(2 M)
3 D's	(3 M)

Computer Grades:

9 A's	(5 M and 4 F)
6 B's	(3 M and 3 F)
1 C	(1 M)
2 D's	(2 M)

Interest in Computers (1 = Low and 5 = High)

5 (High Interest)	- there were	7	(4 M and 3 F)
4	-	4	(2 M and 2 F)
3	-	4	(2 M and 2 F)
2	-	1	(1 M)
1 (Low Interest)	-	2	(2 M)

Location # 2:

Overall Academic Average:

3 A's	(1 M and 2 F)
4 B's	(2 M and 2 F)
9 C's	(3 M and 6 F)
4 D's	(4 M)

Computer Grades:

4 A's	(3 M and 1 F)
8 B's	(2 M and 6 F)
7 C's	(4 M and 3 F)
1 D	(1 M)

Interest in Computers (1 = Low and 5 = High)

5 (High Interest)	- there were	3	(2 M and 1 F)
4	-	10	(6 M and 4 F)
3	-	6	(2 M and 4 F)
2	-	1	(1 M)
1 (Low Interest)	-	0	

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Vita Auctoris

Cézanne Nassr was born in 1959 in London, Ontario to Donald Gregory Nassr and Cecila Anne Ducharme. She has lived in Windsor, Ontario since 1968. In 1978 she entered the University of Windsor as a part-time student. She received her B.A. in Sociology and a Certificate in Criminology and Criminal Justice in 1984. In 1985 she was accepted into the Masters program at the University of Windsor. Since that time, she married Bob Charlebois and they had two children Jordon and Alan. Having received her Master of Arts in Sociology in the fall of 1990, Cézanne will continue working at Deloitte & Touche Inc. were she is employed as an Estate Manager in Insolvency. She plans to work at Deloitte & Touche Inc. until she completes her Ph.D., which she will commence in the Fall of 1991.